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Section!

From Mainframe to OS/2

The Human
Perspective
Page 22

Plus

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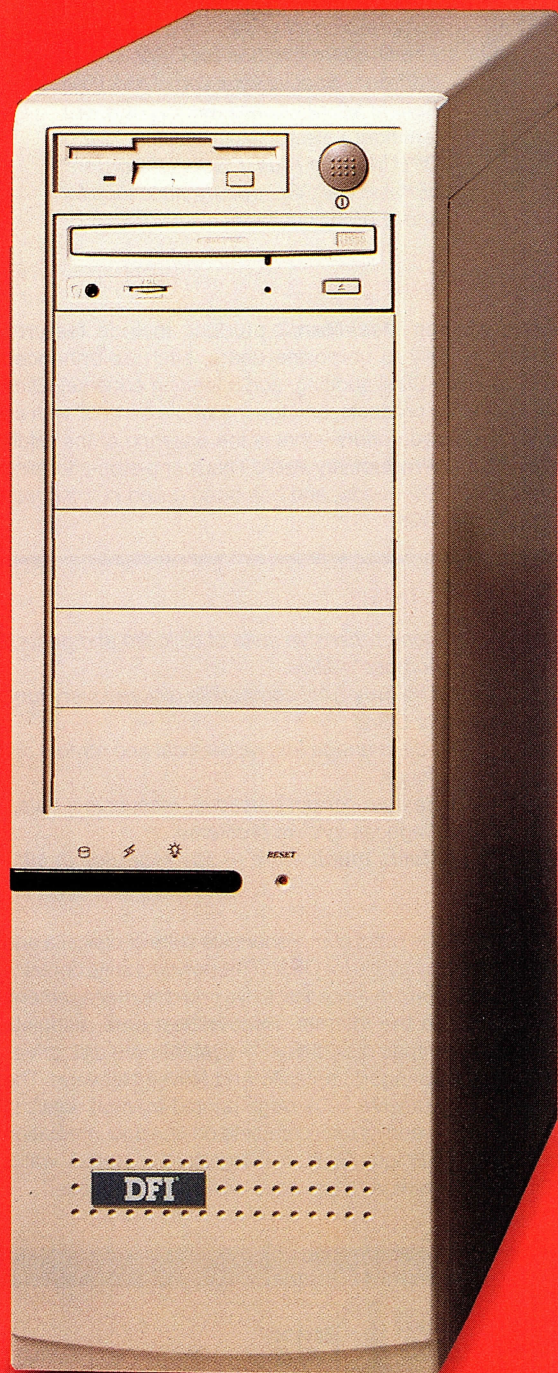
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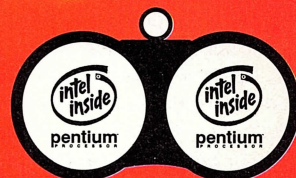


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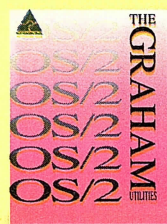
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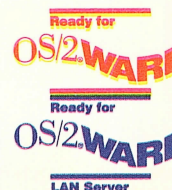


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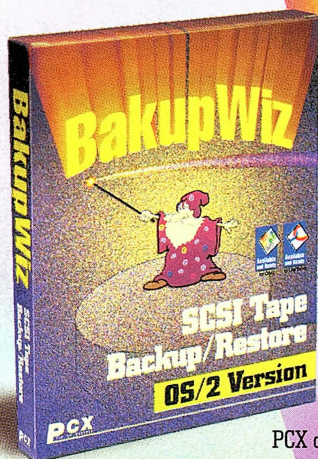
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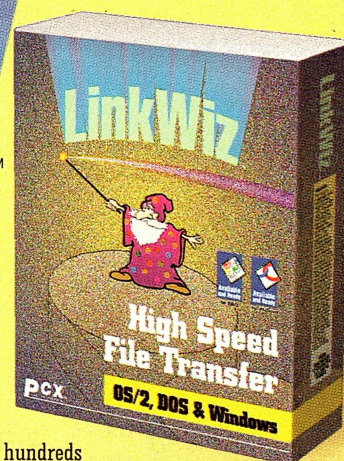
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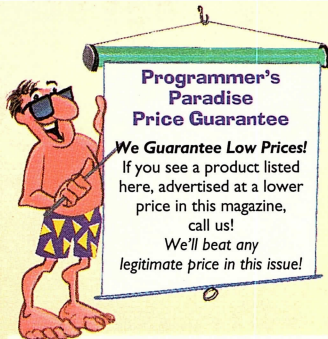
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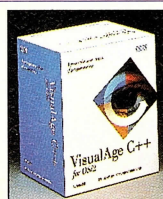
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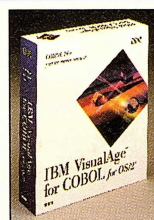
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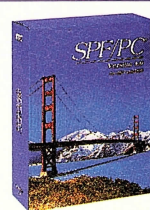
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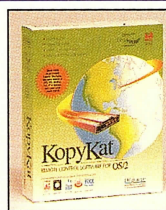
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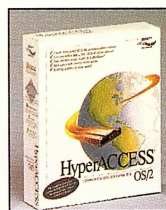


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CSPPO31-GA	\$27
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Perspectives

Road Kill

Last year started as a good year. OS/2 Warp was a mature operating system, the PowerPC port looked like it might be completed soon, OpenDoc and Taligent were progressing nicely, and Windows 95 was nowhere on the horizon. But although 1995 came in like a lion, it left like road kill.

Capping off a dismal fourth quarter, the final week of December delivered a double dose of bad news. Athena Design Inc., maker of the Mesa 2 spreadsheet, closed, CompuServe Inc. publicly admitted that there would be no new development of CompuServe Information Manager for OS/2.

On the surface, an OS/2 zealot might downplay those seemingly unrelated data points. After all, we still have 1-2-3 for OS/2, which Lotus is upgrading to parity with its Windows version. And we can run CIM for Windows (at least, until it's upgraded to a Win32s code level that won't work under OS/2 Warp) or buy Creative Systems Programming Corp.'s Golden CommPass—a better product anyway.

No, these signs aren't so easily dismissed; they're a stern warning about OS/2's increasing inability to maintain a healthy base of native third-party products.

Let's look back at a couple other 1995 news items. Remember the promise of the PowerPC: Twice the power, half the price? OS/2 Warp Connect (PowerPC Edition) finally shipped before the end of 1995. Sort of. To obtain a copy, contact your local IBM sales representative and make a special request, and perhaps you'll be allowed to buy it. OS/2 for PowerPC will probably never be generally available because IBM's Power Series workstations have been made irrelevant by the Pentium Pro. IBM's official word is that, "In 1996, the focus for OS/2 will be on Intel only." The unofficial word is that all lab development on the PowerPC version has been halted.

Remember OS/2 Warp as our on-ramp for the Information Superhighway? In December, IBM announced Virtual Worlds, a way of surfing Web sites in simulated 3D. At least IBM promises that the Virtual Worlds client software (for Windows, of course) will run under Win-OS/2. We don't even get *that* much with IBM's InfoMarket NewsTicker, a useful real-time display of news across the Internet. It's initially supported only under Windows 3.x / 95/ NT and requires Netscape Navigator, NCSA Mosaic, or Microsoft Internet Explorer (although OS/2 support is promised real soon now).

That's a nice thank you for choosing IBM's own

operating system (OS/2 Warp) and IBM's own Web browser (WebExplorer).

Maybe "road kill" is a little strong, since not all the year-end news was bad. In December, IBM announced that three of the top five PC manufacturers in Russia signed OS/2 Warp preload agreements. Lotus Notes Mail will be available for OS/2, as will be an update to NetView for OS/2. IBM shipped its TCP/IP for OS/2 Programmer's Toolkit before the end of the year also.

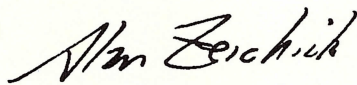
As far as the operating system itself, OS/2 Warp Server's release date is on February 27th. The next version of OS/2 Warp (Intel Edition), code-named "Merlin," should give us a revamped user interface, OpenDoc, Developer API Extensions, Object REXX, and a patch for the single-input-queue problem. OS/2 Warp for Symmetric Multiprocessing is still promised for 1996. OS/2 sales seem to be going strong, especially if you count a contract to provide as many as 400,000 copies to the U.S. Navy over the next five years.

Consumers weren't completely forgotten, as IBM heralded the release of MSR Development's MicroLearn Game Pack II; Maxis' SimCity 2000, SimTown, and Widget Workshop; and Stardock Systems' Galactic Civilizations 2.0 and Avarice Preview. (That's nice, but not much to show for IBM's investment in promoting OS/2 as a gaming platform.)

The problem is that there's next to nothing from IBM uniquely designed for OS/2. Throughout 1995, we received a stream of announcements that IBM's most important development tools and client applications—those which really demonstrated OS/2's power—were being ported to Windows NT and Windows 95.

The real commitment lies with those few remaining independent software vendors who remain focused on OS/2. There are even a few new ISVs entering the field. Many are small start-ups, but we also have a handful of well-known names: Btrieve Technologies signed on in December, for example.

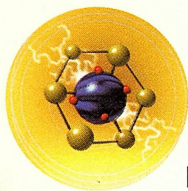
As we begin 1996, there's still life in the OS/2 community. And hope.



Alan Zeichick
Editor-in-Chief

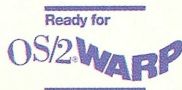


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Letters

"The "OS/2 Developer" section will entice me to venture into other power features of OS/2."

Doesn't Like It

Dear Editor:

You asked for feedback on the inclusion of the "OS/2 Developer" section in OS/2 Magazine, so I'll give you some. I don't like it.

Although it's probably true that readers of OS/2 Magazine are power users—anyone using this operating system likely falls into that category—but to equate this audience with programmers and developers is a mistake. Your magazine won't have one vision; it will develop a severe case of double vision, and instead of being more focused, your identity will blur.

Naturally, given that the operating system is more technical than Windows, you've always made space for columns such as Mark Minasi's and Dick Goran's. But what has defined you (in relation to OS/2 Professional and OS/2 Developer) has been the more mainstream reviews from Brian Proffitt and the excellent "Tips and Tricks" of David Reich. Their work has provided an excellent educational core to the magazine, which has helped many people improve their systems and—the Holy Grail!—their productivity.

But will that audience get very much from Dean Roddey's article on "Debugging From the Inside Out"? I doubt it. And in the competition for editorial space, who will win? I'd certainly hate to miss an article by Lou Miranda because the "OS/2 Developer" side wanted to run a piece on the intricacies of the System Object Model.

Of course, you'll understand that I've taken the trouble to write this because your magazine is important to me and my work. And despite my doubts, I very much wish you luck.

Anthony Hyde

were abandoning the consumer market—we're not. (Letters supporting the merger, and others questioning our sanity, have been running neck-and-neck.)

Our plan is that the "OS/2 Developer" section will comprise, on average, about one-third of our monthly editorial content. The remaining two-thirds will be the same type of coverage that we've offered from the beginning, geared to intermediate-to-advanced end-users, power-users, and systems administrators.

We realize that not every reader will enjoy every part of OS/2 Magazine—but that's always been the case. We'll continue to do our best to make sure that we have something for everyone. But the facts of the matter are that now OS/2 Magazine is in the best position to grow along with an improving OS/2 market (or weather a flat or declining market.)

-Alan Zeichick

Does Like It

Dear Editor:

I'd like to thank you for OS/2 Magazine's new direction. I've always enjoyed reading your magazine in the past, but thought that a little more than a REXX column was required for those programmers who enjoy developing for OS/2 for personal use. The addition of the OS/2 Developer section will entice me to venture into other power features of OS/2, such as System Object Model and the Workplace Shell.

Thanks and keep up the good work.

Raymond Dans

"The World of Objects" was actually planned as a SOM-specific column for OS/2 Developer magazine, and now we can enjoy this column, with a slightly wider focus, every month in OS/2 Magazine.

-Alan Zeichick

Good FTPs for OS/2 Fixes

Dear Editor:

In December 1995's "Dateline: OS/2" (p. 11), Alexander Antoniadis lists software.watson.ibm.com as an FTP site from which to get OS/2 fixes.

This site is no longer a good source for OS/2 fixes—they don't seem to be putting anything new on that server.

Good FTP sources are [ftp.software.ibm.com](http://ftp.software.ibm.com/ps/products/os2/fixes/v3.0warp) in the /ps/products/os2/fixes/v3.0warp directory, or [ftp.pc.ibm.com](http://ftp.pc.ibm.com/pub/corrective_service) in the /pub/corrective_service directory, which is also available via the World Wide Web, with a nice search capability, at <http://www.pc.ibm.com/files.html>.

Aron Eisenpress

Errata

Many of you wrote to us in reference to the December 1995 "Dateline: OS/2's" (p.11) report. Namely about the defect in some Intel motherboards that use the CMD EIDE chipset on the motherboard.

Aron Eisenpress kindly pointed out: "You cannot use the /v option on ibm1s506.add until after you've installed the update that fixes the bug, because earlier versions of the driver don't include the code to recognize these bad chips."

Marcia King summed up her experience: "I followed your advice about adding the V switch to the ibm1s506.add line in the config.sys file, but got unexpected results. On my next boot-up, the system said it couldn't continue because the clock1.sys file was missing! Thank heavens for archived desktops!!!"

And Leroy Latta notes: "I tried the /v addition, which you suggested, to see if I could get the statements identifying my CMD chip. I did not get anything similar to what you suggested; it goes by fairly quickly and print screen won't capture it. But, I appear to get a message that the chip has been identified and that other features will not be loaded."

As Aron pointed out, the information was wrong, and, although it seems nonsensical, you have to install the fix to find out if you have the problem. I can't say that flipping the switch was the result of Marcia King's problems, but always have your OS/2 utility disks handy, along with some sort of archiving facility, when making changes to your system.

-Alexander Antoniadis

Several readers have expressed similar concerns about the merging of OS/2 Developer into OS/2 Magazine. Some readers are worried that the developer content will take up too much of the magazine. Others read our decision to merge the two publications as a statement that we

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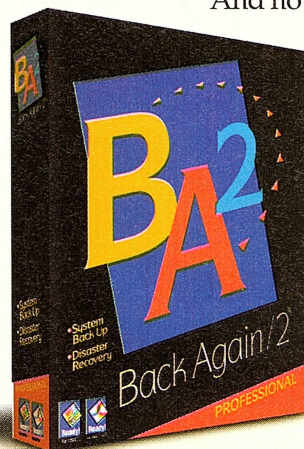
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Grim Tidings for the New Year

BY ALEXANDER ANTONIADES

No OS/2 for the PowerPC

The troubled OS/2 for the PowerPC seems to have disappeared courtesy of IBM's magic wand, only to appear at special showings for a select audience. Apparently, IBM will make OS/2 for the PowerPC available only to those who special order it. Also, this release is only being made public to satisfy certain contractual obligations that IBM has made.

This long overdue release started life a couple of years ago as Workplace OS, a microkernel-based operating system that would run personalities and emulate existing platforms such as Macintosh, Windows, and OS/2. Legal hassles from other OS vendors, combined

with lukewarm customer demand, made IBM shift the focus of Workplace OS, thus turning it into a microkernel-based PowerPC port of OS/2 Warp Connect.

OS/2 Warp Connect for the PowerPC, just one of the many catchy monikers that this project has had, then ran into more problems over the course of 1995. IBM's Boca Raton labs put virtually every available programmer on this project with the hope of porting the resulting OS back to Intel as the next release of OS/2. This massive undertaking ran into numerous snags trying to achieve acceptable performance.

Whether they achieved acceptable

performance or not is something few people will likely find out, however, due to its limited release. Clearly, IBM realized that the lead time the PowerPC had over Intel-compatible chips expired with the release of Intel's Pentium Pro. Hopefully, they're willing to equal the millions of dollars poured into this version of OS/2, which didn't ship, into a future version of OS/2 that will ship.

Kaleida and Taligent gone

In a recent interview in *InfoWorld Electric* (<http://www.infoworld.com>) Microsoft CEO Bill Gates was asked if there were any trends or developments that surprised him over the past 20 years. His first response was, "Kaleida and Taligent had less impact than we expected." If it's any consolation Bill, you're not alone.

These two projects, which held so much promise for cross-platform development, were folded into founders Apple and IBM, respectively. Both alliances came to an end in December. While these technologies will likely find their way into other offerings from these two companies, their impact will be lessened.

Both of these projects came out of Apple's R&D in the late 1980s and became independent joint ventures when IBM took over some of the funding. But this troubled marriage produced too many complications and changes in overall strategy to be successful in the minds of these two companies, despite the fact that their goals were essentially the same.

Taligent was based on the design for an advanced operating system that Apple originally code-named Pink in 1988. It evolved into a set of application frameworks, called Common-



OS/2 APPLICATIONS TOP 15 LIST—DECEMBER 1995

This Month's Rank	Last Month's Rank	Product	Company
1	1	Object Desktop	Stardock Systems
2	2	Partition Magic Personal Edition	PowerQuest
3	4	Voyager CD	DeScribe
4	6	Hobbes CDROM Archive	Walnut Creek
5	3	BackMaster 2.0	MSR Development
6	-	Galactic Civilizations 2.0	Stardock Systems
7	-	GammaTech Utilities	SoftTouch Systems
8	-	DUX Bookshelf—Work & Play	DUX
9	-	FaxWorks Pro 2.0	Global Village
10	-	Avarice Preview CD	Stardock Systems
11	10	IBM AntiVirus	IBM
12	13	BackAgain/2 (OS/2 Professional Ed.)	Computer Data Strategies
13	5	UniMaint	SoftTouch Systems
14	8	Impos/2	Compart GmbH
15	-	MicroLean Game Pack Vol. 2	MSR Development

Since OS/2 Warp and OS/2 Warp Connect are consistently ranked as our top-selling products, and sales of additional licenses can sometimes skew results, this list has been modified to highlight only the top selling OS/2 applications. (Best-seller information courtesy of Indelible Blue.)

Point, supposed to run on top of various operating systems. It promised a tightly integrated C++-based environment where you developed your application once and could deploy on any supported platform with a simple recompile. By the time Taligent was closed, the CommonPoint 1.0 had been completed on AIX and was rumored to be complete, but unreleased, on OS/2 as well. Some of the Taligent code will likely find its way into the next release of OS/2, dubbed Merlin, and IBM's OpenClass class libraries. Any impact that this once-revolutionary technology will have, however, will be negligible.

Kaleida was another cross-platform initiative. Its five-year mission was to make multimedia programs that were completely platform independent. The idea was that a central component, called the Kaleida Media Player, would interpret multimedia documents on the fly and play them back on any platform. Kaleida offered interesting possibilities because it was interpreted, so Kaleida code could be downloaded through a Web browser and then run

through the associated media player.

Despite this and other nice touches, the Kaleida Media Player 1.0, which was completed for Windows 3.1 and Macintosh early last year, never got off the ground. Kaleida Media Player 1.5 was supposed to have an OS/2 version, a beta of which I saw running at Object World in San Francisco, but Kaleida changed its plans and version 1.5, which should be out by the time you read this column, will only be available for Windows and Macintosh.

My advice for OS/2 users: Look for multimedia hope elsewhere. Macromedia has stated that its Director run time, used in a number of popular multimedia titles, was successfully ported to OS/2. Whether this development will cure the multimedia drought on OS/2 or not, it's too early to say.

IBM licenses Sun's Java technology

On the brighter side, IBM has finally agreed to license Sun's Java language and intends to ship a Java web browser for OS/2 later on this year. Java is a platform-independent language, which

creates programs that can be loaded from the Internet on to any machine that has a Java-capable browser. For more information about Java and OS/2, check out the IBM Java web page at <http://ncc.hursley.ibm.com/javainfo/>.

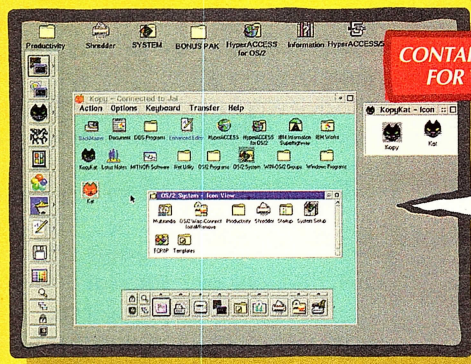
IBM takes over OpenDoc for Windows

In another move, which will leave people wondering what impact OpenDoc will have once it's finished, IBM officially took over the development of the Windows version of OpenDoc from Novell. Even though Novell hasn't much help with its on-again off-again enthusiasm for OpenDoc technology, the move doesn't bode well for this initiative.

This takeover shows the lack of momentum of OpenDoc in the all-important Windows market and signals the probable loss of OpenDoc on another operating system, Netware. Despite this pessimism, IBM expects to have OpenDoc for Windows 95 and Windows NT in beta by the end of the first half of 1996, with the final release in the third quarter. **OS/2**

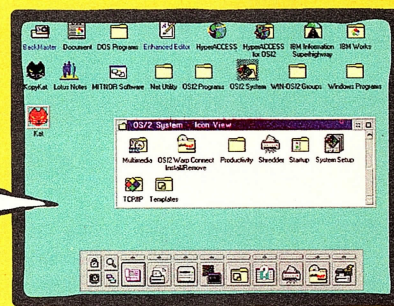
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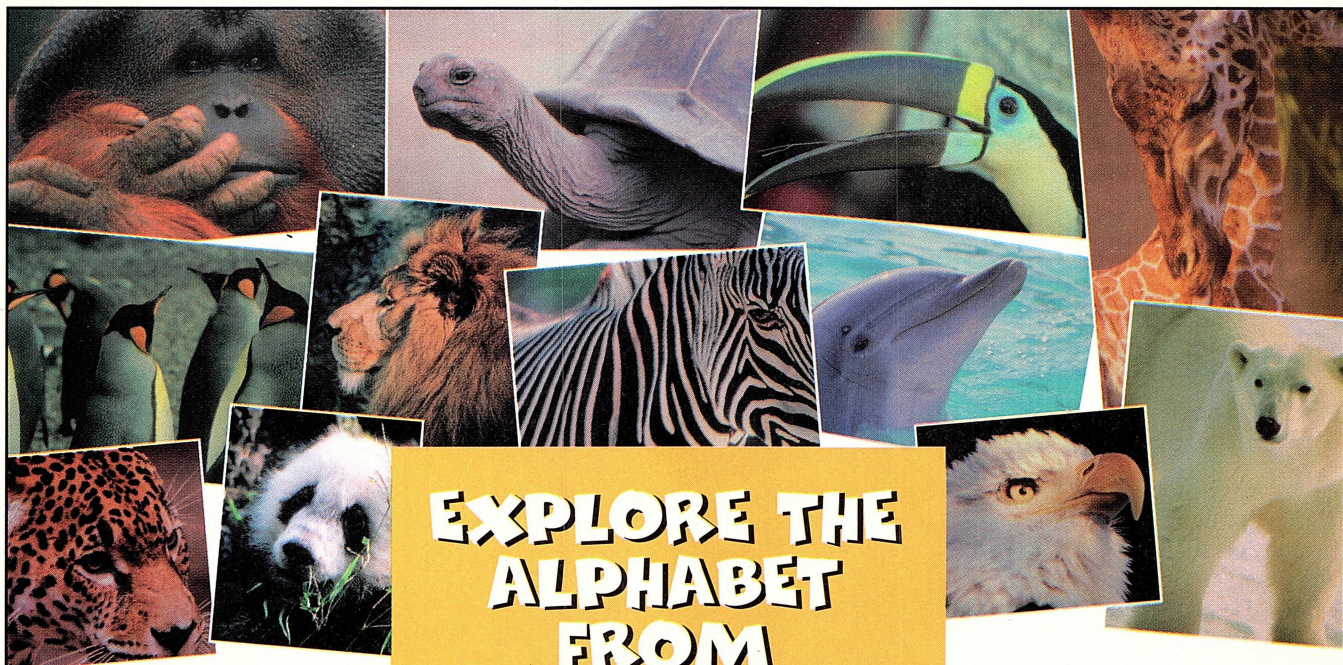


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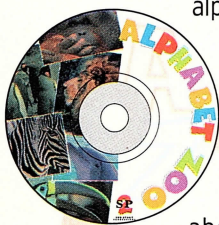
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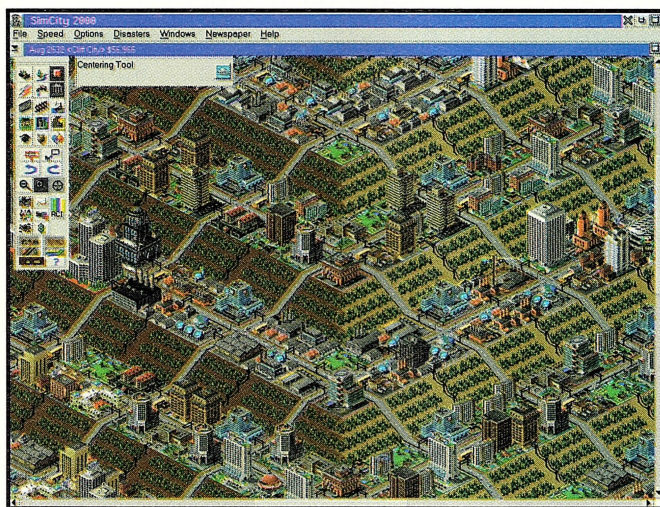
SimCity 2000 for OS/2

Part of popular city simulator

Maxis announces that it has successfully ported its premier strategy game to OS/2. SimCity 2000 for OS/2 lets users govern a population of simulated citizens with competing interests, and try to keep the city's services running while balancing the budget. This latest version runs in a resizable window in the Workplace Shell and can read SimCity Classic as well as SimCity 2000 cities created by other PC platform versions (DOS, Windows, and Windows 95). SimCity 2000 for OS/2 is available for \$49.95.

Maxis Inc., (510) 254-9700, fax (510) 253-3736, e-mail support@maxis.com, or visit its Web page at <http://www.maxis.com>.

READER SERVICE NO. 101



BMT Micro, (910) 791-7052, fax (910) 350-2937, or e-mail 74031.307@compuserve.com. Screenshots and a demonstration version are available at <http://www.wilmington.net/bmtmicro/zoc>.

READER SERVICE NO. 103

Hobbes-Archived CD-ROM December 1995

Latest edition of OS/2 programs

Walnut Creek has updated its CD-ROM archive, containing files from both its own FTP site (<ftp.cdrom.com>) and the University of New Mexico's FTP site (hobbes.nmsu.edu).

This disc includes updates and patches for OS/2 Warp, commercial demos, games, graphics programs, system utilities, 5000+ icons, Internet connectivity aids, UNIX utilities, and device drivers. This latest version of the CD-ROM archive is BBS ready and comes on two discs. The price is \$29.95 for a one-time purchase and \$19.95 as part of a subscription.

Walnut Creek CD-ROM, (800) 786-9907 or (510) 674-0821, e-mail order@cdrom.com, or visit its Web page at <http://www.cdrom.com>.

READER SERVICE NO. 104

Doubleshot 150

Dual Pentium with OS/2 SMP

The Diamond Flower Electronic Instrument Co. (DFI) is announcing the release of a new dual 150Mhz Pentium Processor PC that comes bundled with OS/2 Warp SMP 2.11. The Doubleshot 150 comes with 32MD of RAM, 512K of pipeline burst cache, a 1.6GB hard drive, and a six-speed CD-ROM. Other specifications include eight SIMM slots capable of handling 512MD of RAM, three PCI slots, three ISA slots, one shared slot, and a DFI WG-9140P which has a Weitek P9100 chipset. Pricing was unavailable at press time.

Diamond Flower Electric Instrument Co., (916) 568-1234, fax (916) 568-1233.

READER SERVICE NO. 102

ZOC 2.13

Shareware term goes commercial

Emtec Innovative Software and BMT Micro have released a commercial version of the OS/2 shareware terminal program ZOC. In addition to being a telnet client, ZOC offers: VT-102, TTY and ANSI emulation, 9,999kb scrollbar buffer, Internal Xmodem, Ymodem, Zmodem, CompuServe B+, and External protocol support including DOS protocols, REXX programmability, host mode, auto-login, and IEMSI support and multiple phone books with cost accounting. ZOC supports ISDN modems and an ISDN module is available for plug-in boards that supply a *capi.dll* driver according to the CAPI (Common ISDN API) v1.10 specification. ZOC is available for \$89.95.

Galactic Civilizations 2.0

Update to OS/2 game

Stardock Systems is releasing an updated version of its OS/2 strat-

egy game, featuring improved graphics and game play. Galactic Civilizations 2.0 features a new set of graphics and a new digital stereo soundtrack. Starships now have ranges to bring a new depth of strategy to the game and computer-controlled star governors to help manage planets. Galactic Civilizations 2.0 is available for \$59.95, with upgrades from Galactic Civilizations 1.0 priced at \$29.95.

Stardock Systems, (313) 453-0328 or (313) 453-1480, e-mail Stardock95@aol.com, or see its Web site at <http://oeonline.com/~stardock/>.

READER SERVICE NO. 105

List Conversion Plus 1.0

Manage those mail lists

Group 1 Software is announcing the release of its program for managing databases and mailing lists. List Conversion Plus can convert data files into custom formats such as separate city, state, and zip. Title codes can also be converted from one form to another. Also, names and other criteria can be compared to determine the gender of names on a list for appropriate salutations. List Conversion Plus is available for \$15,000, and an annual maintenance program is also available.

Group 1 Software, (800) 368-5806 ext.383, or fax (301) 731-0360.

READER SERVICE NO. 106

Take Command for OS/2 1.0

New GUI command line

JP Software is announcing the release of its new presentation

manager command line program for OS/2. Take Command for OS/2 allows most OS/2 command line programs to execute in a resizable **Presentation Manager** window that, for the most part, functions the same way as a windowed OS/2 session. Additionally, Take Command offers the same command line behavior as JP Software's

4DOS and 4OS/2 products, as well as a few graphical enhancements, such as a toolbar and the ability to change fonts. Take Command for OS/2 retails for \$69, with a printed reference manual available for an additional \$15.

JP Software, (800) 368-8777 or (617) 646-3975, or fax (617) 646-0904.

READER SERVICE NO. 107

Just Announced OS/2 Internet Sites

OS/2 E-zine

A brand new OS/2 electronic magazine with hints, tips, feature stories, software reviews, interviews, and more. <http://www.isisnet.com/haligonian/os2/>

Dave Briccetti's OS/2 Warp Programming Tips and Samples

A very nice assortment of programming tips and freelance presentations. <http://www.davebsoft.com/Programming/tips/>

Ultimate Sound for OS/2

An excellent site of sound drivers, players, utilities, music, and more. Interested shareware authors may contact the site owner who can offer space for your own home page. <http://wvnvaxa.wvnet.edu/~hrieke/us.html>

International OS/2 User Group

Even though this group is based in the U.K., its members are worldwide. Lots of information about the group, its magazine *Pointers*, and links to various software, newsgroups, news, and more. <http://www.lunatech.com/os2ug>

Jumbo (A Shareware and Freeware Site)

Massive amounts of shareware and freeware to be found at this site. <http://www.jumbo.com/> Specific links to OS/2 software are: www.jumbo.com/bus/os2/ (Business), www.jumbo.com/home/os2/ (Home), www.jumbo.com/util/os2/ (Utilities), and www.jumbo.com/graph/os2/ (Graphics)

Tim Sipple's WarpPad

Tim is the author of the *OS/2 and OS/2 Warp Frequently Asked Questions* list as well as co-author to IBM's *Official OS/2 Warp FAQ's* (IDG Books). <http://www.secant.com/sipples>

UPDATED:

South Australia OS/2 Special Interest Group, <http://www.ozemail.com.au/~sphampel/os2sig/>

The Ultimate OS/2 Gaming Page

<http://apts178.residence.gatech.edu/os2/os2games.html> (NOTE: this site is NOT up during college breaks, so be sure to add its mirror site below to your QuickList if you can't connect to the regular site. During school the mirror site will be behind.) Mirror Site: <http://havoc.gtf.gatech.edu/buie/os2games.html>

(Information courtesy of Vicci Conway.)

Just Announced

Contact Connection 1.22

Native contact manager

Computer Interface Corp. is now shipping version 1.22 of its OS/2 contact management program. Contact Connection allows users to enter unlimited amounts of data about each contact, which can be used to print form letters, envelopes, and mailing labels and to automatically dial phone numbers. Contact Connection also includes an Action Tracker to track activities related to a contact, and to remind users of action items that need to be completed. The File Tracker feature allows users to maintain a database of all files related to a contact, such as all letters that have been sent to a particular individual. The price is \$99.

Computer Interface Corp., (800) 992-3428 or (508) 651-8111, or e-mail

71151.1526@compuserve.com.

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(609) 234-1500, fax (609) 234-1920, or e-mail 71511.151@compuserve.com.

READER SERVICE NO. 109

Golden CommPass Spell Checker

Spell checking for offline reader

Creative Systems Programming is announcing an update to its CompuServe offline reader as well as an additional spell checking add-on, which will be available separately. The new spell checker is currently available with a U.S. English dictionary. Other languages are due out in the first quarter of 1996 and include U.K. English and German. Golden CommPass 2.22, a free upgrade for users of 2.2, is necessary to use this add-on. The Golden CommPass spell checker is available for \$29.95.

Creative Systems Programming,

LAN Intensive Care Utilities 1.4

Latest network utilities

Lieberman and Assoc. announces an update to its OS/2-based network utility. New in LAN Intensive Care Utilities 1.4 is the ability to handle an unlimited number of users as well as improved management of log files, home directories, and RSRC commands. Pricing starts at \$299 for a 20-user license. Upgrades from earlier versions are free.

Lieberman and Assoc., (800) 829-6263 or (310) 550-8575, fax (310) 550-1152, or e-mail lanicu@ibm.net.

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OS/2

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H5601

Gotchas and Minutia

BY DAVID REICH

TIP 216:

MULTIPLE WIN-OS/2 SESSIONS

Q: How do I know if I am running more than one Win-OS/2 session? Each time I open an application from the OS/2 desktop, does the application run in an existing open Win-OS/2 session or is a new session opened?

A: Whether or not newly opened Win-OS/2 programs run in an existing session or a new one, they are handled on a per-program object basis. Each program object, representing a Windows or Win-OS/2 program, has the session type specified for it on the **Session** page in the **Settings** notebook.

For example, if you have several Win-OS/2 programs set up to run in Win-OS/2 full-screen sessions, and you open each from its program reference object, each one will be started in a separate Win-OS/2 session in its own Virtual DOS Machine (VDM). You can also see these windows by bringing up the Window list with <Ctrl+Esc> or a chord (clicking both mouse buttons simultaneously) on an empty space on the desktop.

If you opened multiple Win-OS/2 programs, using the Win-OS/2 Program Manager, then they are all running in the same session.

If you run your Win-OS/2 programs seamlessly on the OS/2 desktop in their own windows, the setting on the **Session** page of the **Settings** notebook will determine whether they run in a com-

mon Win-OS/2 session or each in its own session. Again, you could bring up the Window list to see; if each has its own top-level entry in the Window list, they are running in separate Win-OS/2 sessions. If one or more are listed as a kind of subheading in the Window list under another Win-OS/2 session, then these are running in the same session.

TIP 217:

MINIMIZED WIN-OS/2

Q: In the June and September 1995 issues of *OS/2 Magazine* you commented on starting programs minimized ("Extending LIBPATH," June 1995, p. 67 and "Minimize on Start," September 1995, p.61). These tips seem to be talking mostly about OS/2 PM programs.

Is it possible to start up a Windows program in a Win-OS/2 session and have it start minimized? I want to put this program in the Startup folder so that the Fastload feature can be enabled at boot time, without having to make any further adjustments.

A: If you want to start a Win-OS/2 program minimized, the only reliable way to do it is to invoke the program with:

```
START progname /MIN <enter>
```

You can't really start a Win-OS/2 program from a program reference object and have it start minimized, so you need to start it from a command line with the **START** command. Just typing the program name to start it will not minimize it, but using the **START** com-

mand with the **/MIN** parameter will take care of it for you. If you want to do this upon system startup, just add the command to the *startup.cmd* file.

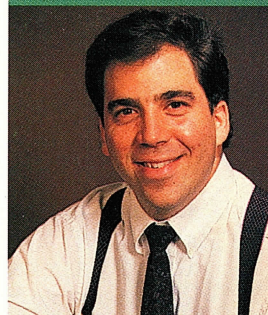
TIP 218:

REINSTALL WITHOUT THE HASSLE

Q: I am somewhat new to OS/2 Warp and love it! I do have a question, however. With Windows 3.1, if I had a problem, I could reinstall Windows in another directory, rename old *.grp, *.ini, reg.dat, and *.foz (in the system subdirectory) files, and then copy new Windows files to old directories. By renaming renamed files, I would have the same Windows settings that I had earlier. Does a method exist to do this reinstall in OS/2 Warp 3.0? I want to do a clean reinstall, without having to reinstall Communications manager, Client Access/400, and so on.

A: It appears that you are attempting to do something similar to what I do on occasion—reinstall your system without having to reinstall all of your applications from scratch. I'll explain how I do it, but be forewarned—you have to be very familiar with all of your applications as some of them run procedures you can't do manually, and these procedures will not always work.

Assuming you are doing a clean reinstall—with no application information in your *config.sys* file and no customization of the Workplace Shell in terms of settings or objects—the first thing to do is back up your *config.sys* file. Then,



Tips & Tricks

either record or try to remember your customization of the Shell.

Next, back up all your application files (unless they're on a different drive) and all your various .ini files for applications that might reside on the boot drive. Now, do your reinstall.

It's all manual from here on. First, open the newly created *config.sys* file and your backup copy in a text editor. Compare them line for line and make the appropriate changes in the new copy. If you're comfortable with everything in the old copy and not changing versions of OS/2, you can put the old copy back. If, however, you are even cleaning up the *config.sys* file, then combine them manually.

Once your *config.sys* is all set, recreate all of the needed desktop objects and restore the backed-up application .ini files. The real trick is knowing which applications registered new Workplace Shell object classes (new classes, not just creating objects such as folders). These applications must be reinstalled to operate correctly.

You could also use any product that is commercially available to back up

and restore Workplace Shell desktop configurations.

This is not a trivial process. But if your configuration is relatively consistent, and if you don't install and delete applications often, then you should be able to get through it.

TIP 219:

MODEL BEHAVIOR

Q: I'm installing a Citrix WinView Applications Server, which is OS/2 2.x based, and have run into a situation similar to the one discussed in your September 1995 ("Copying EAs," p.63) column.

WinView's user directory structure looks like this:

```
N:\USR
+--Loginname
+--Extra!
+--Home
+--MSApps
+--OIWin
```

```
+--WINDOWS
+--MSApps
| +--Proof
+--MSMail
| +--MSMail
+--SYSTEM
```

The user has full rights to the Home directory and read and write rights to most of the .ini files within the directory structure.

What I would like to do is establish several model accounts (subdirectories and files with the appropriate EAs) and do the equivalent of an XCOPY when setting up a new user account.

Do you have any suggestions as to how to do this while preserving the EAs?

A: Quite simply, you can use XCOPY. XCOPY is a bulk file copy with a variety of parameters available to traverse subdirectories and operate on file attributes, the same as if you were to change a subdirectory, issue a copy command, then change subdirectories, issue another command, and so on.

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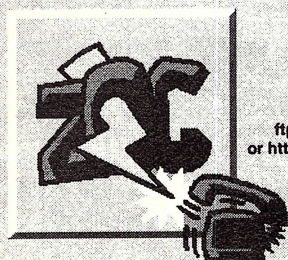
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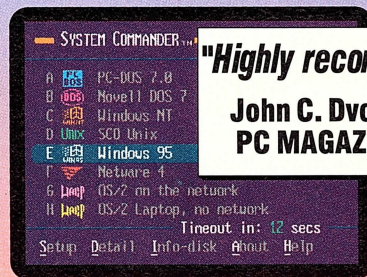
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Tips & Tricks

The first step is to create a model subdirectory to act as a template for your accounts. Take an active one, or one you want to model after, and use *XCOPY* in a work area to set up all of the file and subdirectory structures. Once that is complete, use the *ATTRIB* command for each file whose attributes you need to set up (for example, read only).

ATTRIB has options to change the read only (R), archive (A), hidden (H), and system (S) attributes. To turn the attribute on, type "+" before the attribute, to turn it off, type "-". For example, to turn on read only, use:

```
ATTRIB +r myfile.dat
```

To turn off read only and hidden attributes, use:

```
ATTRIB -r -h myfile.dat
```

You get the idea. Once you have the entire structure set up, simply *XCOPY* it to create a new one. Just be sure to use all of the attributes on *XCOPY*. As a reminder, think of *HOTSERV* and pre-

cede each letter with a slash.

```
XCOPY *.* d: /h /o /t /s /e /r /v
```

Now you have a fresh new installation.

TIP 220:

IMAGES OF DOS

Q: I am trying to run an MS DOS window under OS/2 Warp from a disk image. I was wondering if you could please give some general tips.

A: I know of several ways to run a specific version of DOS under OS/2. The first way is to put the DOS disk in drive *a:*. Next, open the **Command Prompts** folder and look for the object titled, **DOS from Drive A**. Open this object. You'll now get a virtual DOS session (VDM), with the DOS code loaded from the disk you put in drive *a:*.

Another procedure eliminates the need to have a DOS disk with you all the

time. Create an image file on your hard disk and point to the image to use for loading the DOS code.

Find the DOS disk with the appropriate version of DOS. Make a copy of it, as you will need to make some modifications to it. Now, make sure that everything referenced in the *config.sys* and *autoexec.bat* files on this disk do not reference files on hard disks, unless they specify full path and file names. Because you are using a specific version of DOS, many of the files on the OS/2 boot drive are not compatible with it.

Next, copy the file *fsfilter.sys* from the *\os2\mdos* directory on your OS/2 boot drive to the disk. Then, put a **DEVICE=** statement into the disk's *config.sys* to load it when the image is started.

Put this copy in drive *a:* and use the **VMDISK** command to create your image. **VMDISK** will read the disk and create the DOS image on the hard disk. A sample **VMDISK** invocation is:

```
VMDISK A: d:\dosimg\dosing.dsk
```

You now have an image of the DOS



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disk. Finally, set up the program reference object. An easy way to do this is to open the **Command Prompts** folder and locate the object titled **DOS from Drive A**. Right-click on it to bring up the **Context** menu, and select **Copy** with a left-click. When you are asked to rename the new copy, choose a name that reflects that it is starting DOS from an image. Now bring up the **Settings** notebook from the **Context** menu, and left-click on the **Session** tab. Select **DOS Settings** and locate the setting for **DOS_STARTUP_DRIVE**. Highlight it with a left-click and notice that an **A** is in there. Overwrite it with the path and name of the file that you have just created with **VMDISK**. Close that dialog window, saving the settings, and then close the notebook. Now when you open that object, you will be starting the DOS image that you created from disk.

A few other items of note for modifying the disk, before you create the image, have to do with utility programs that you may use. For example, if you use **HIMEM** or **EMM386** memory extenders, you will have to replace them with the ones that come with OS/2. You can accomplish this action by copying *himem.sys* or *emm386.sys* from the `\os2\mdos` directory on your OS/2 boot drive to the disk, replacing the files of the same name.

Mouse support is also important. Make sure to remove all lines from the `DOS config.sys` and `autoexec.bat` files that load it. If you require mouse support in this VDM, find the file `mouse.com` in the `\os2\mdos` directory and copy it to the disk. Then, type in a line in the `autoexec.bat` file on the disk that simply says "Mouse". This change will provide the mouse support from OS/2 Warp.

Other less critical items should also be noted, and you can find them by typing: "HELP VMDISK" at an OS/2 command prompt.

TIP 221:

INSTALL VS. UPGRADE

Q: A few years ago, I bought a hand scanner that only came with DOS/Windows drivers and Windows software. It worked acceptably under

OS/2 2.1, but I really wanted a native OS/2 program. When the OS/2 Warp Fullpack came out, I installed it over OS/2 2.1. The Windows software worked as well as ever; maybe even a little better. Then I bought and installed a new Windows scanner program. It worked beautifully until I tried to close the raw scan window—it locked up. Any attempt to shut down the program after doing a scan would cause it to lock, sometimes locking up the system. At the time, I attributed this quirk to a slight incompatibility in my Mustek-compatible scanner. I reinstalled OS/2 Warp after reformatting the OS/2 boot partition. The problems are now gone.

What is the difference between the upgrade installation and the pure 3.0 installation? It never occurred to me that my upgrading could have caused these problems, but now it certainly appears to be the case.

A: In general, I would not have suspected corrupted *.ini* files from the problem description. However, since you tried reinstalling without formatting and that did not work, and reinstalling with a boot drive format did, it looks like your *.ini* files had some problems. Reinstalling after formatting the drive forced new *.ini* files to be created for you.

The only real difference between an upgrade install (which I call a *dirty* install because you're not formatting the partition when you do it) and a *pure* installation as you put it (I call this a *clean* install), is that on a dirty install, the existing *.ini* files are migrated as opposed to recreated.

If you have an upgrade package of OS/2 Warp, a sniffer is included that makes sure that the first time that you try to install it you have an operating system on your partition to upgrade. Other than that, the full package and the upgrade package are identical. What winds up on your hard disk from both is certainly identical. The only difference in your scenario is new versus old *.ini* files.

If you migrate old *.ini* files, you might be perpetuating bad data that could be lying in wait to bite you. If an application had hurt some *.ini* file data, but it had not been used yet, a migration will perpetuate that exposure. A clean install will eliminate that risk.

TIP 222:

PACKING TO EXECUTE

Q: What is a Warp compressed *.exe*? I recently installed WatchCat, and it notified me that I could install a compressed version of the executable. The *.exe* was about 33% smaller, which is nice, but what sort of compression are we talking about? Can regular OS/2 2.x *.exes* be converted into compressed *.exes*?

A: I have not seen this message myself, so I can only assume it is just a packed executable, which is smaller but requires expansion when loaded into memory. A compressed *.exe* is one built with the */xepack* option on the linker. This option causes the linker to compress the *.exe* to take up less disk space. Because of the compression, decompression is needed before the code in the *.exe* is usable. This function will take some processor time when you load the file (*.exes* and *.dlls* can be packed). Because your computer is often I/O bound (the system is waiting for the disk to complete operations), the processor cycles used to decompress the *.exe* won't be missed. Overall, packed executables load faster because of the reduced disk input and output needed. In fact, much of the OS/2 Warp system itself is built with packed code files for just this reason.

Executables can't be packed after they are built. This packaging must be done by the linker and is opted for or against by the application developer. The user can do nothing about it.

It's likely that someone will come up with an *.exe* packer for users to pack executables after they're built and shipped, but at this time I know of none. (If anyone knows of one, please let me know, and we'll spread the word.) **OS/2**

David Reich has been with the OS/2 development team since 1987. David is a contributing editor and has written numerous articles on OS/2 and is the author of Designing High-Performance OS/2 Warp Applications published by John Wiley and Sons. Questions can be addressed to David via CompuServe at 76711,632 and Internet at speedracer@austin.ibm.com.

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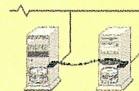
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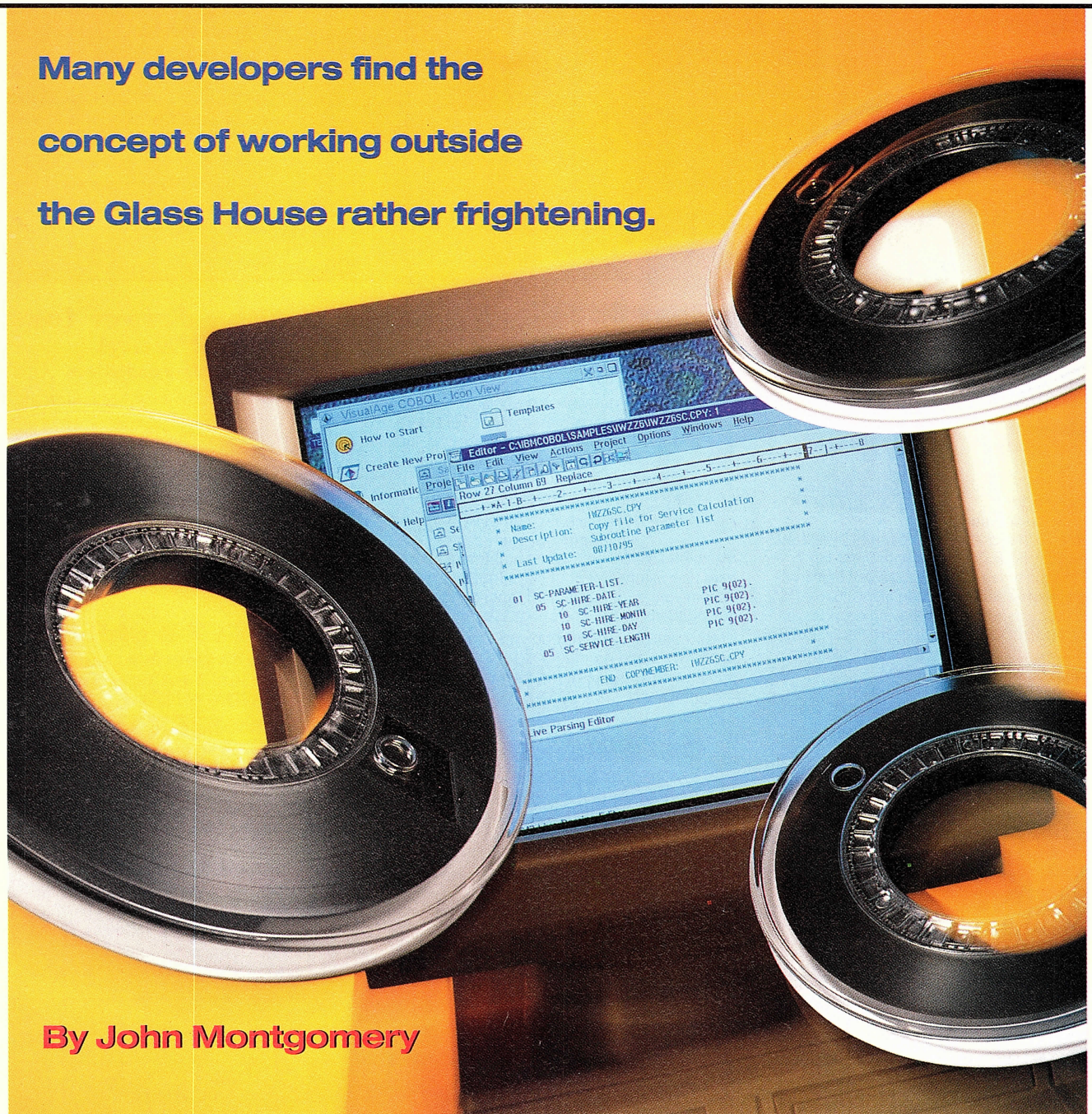


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Reader Service No. 13

Migrating Mainframe Programmers to OS/2

Many developers find the concept of working outside the Glass House rather frightening.



By John Montgomery

Ask a mainframe programmer about moving to OS/2, and you'll experience one of two reactions. If you're lucky, you'll hear an enthusiastic response. But it's equally likely that you'll be treated to a talk about The good ol' days when life was simple. Everyone knew where the data lived, which programs were running, and when they should start. The systems' support department had all the expertise on the systems that ran and all the control over the programs running in them. Why would anyone want to leave such a secure environment?

Despite the well-known benefits of application development in OS/2—multitasking, leading-edge programming tools and methodologies, availability of a GUI, increased productivity, reduced cycle time, and improved technical vitality for the organization—the challenge of migrating your *programmers* may be one of the most difficult. The benefits stated above may not be sufficient to motivate a mainframe programmer who either finds it difficult to make the required changes or simply refuses.

The goal in making this transition is for your programming organization to avail themselves of the benefits of OS/2, using a step-by-step strategy that capitalizes on existing skills, while acquiring and using the new ones needed to compete in today's marketplace.

You are apt to meet with these five basic types of resistance in your programmers:

Know-It-Alls. These are the self-appointed experts whose sole mission in life is to let you know how much better informed they are than you. They can be recognized by statements such as "Oh yeah. OS/2 is just like UNIX except the slashes go in the other direction." Stay away from Know-It-Alls; they aren't going to help you.

Devil's Advocates. Whenever anyone repeatedly plays the Devil's Advocate on your plan to migrate to OS/2, what they really mean is "Your idea stinks, and I'm going to tell you why!" They're talking, and they're not listening. Stay away from these people, too.

Fear. This includes fear of failure, fear of the unknown, and fear of upsetting the boss. You will have to identify the sources of this fear and relieve them.

The old way of thinking. You're expecting a set of mind-set changes from the mainframers, and you will have to ease the transition period. Be on the lookout for such behavior as printing out entire sets of online documentation or uploading text files for editing on the familiar mainframe editor.

Hundreds of excuses. "I don't have the right hardware." "I don't have time to learn anything new." "I don't know how to get started." "It doesn't fit in with what I do now," and "I'm not willing to lose any function or productivity." Listen carefully to the excuses; separate the wheat from the chaff, and mold your conversion strategy around what remains.

Let's look more closely at the various tools you have available to help encourage mainframe developers to be more open-minded about OS/2. Let's first, however, talk about other changes those old hands have faced and see if some lessons can be applied to our current situation.

Mainframe successes

Mainframe programmers are intelligent people, and they

have gone through other migrations in their work processes before. It's useful to look back at some successful transitions that have been made in the mainframe world to see if any lessons can be drawn from them. Figure 1 shows some of the changes that have occurred in several different aspects of mainframe programming.

First of all, the programming languages that were used to build programs have progressed from machine code to high-level, nonprocedural products, with several steps along the way. Each step required fewer lines of code and less dependency on knowledge of the underlying hardware.

The hardware devices used in program development made a significant transition from punch cards to dumb terminals. This change brought about an enormous productivity enhancement but ended the ability to "touch and feel" your programs—a desire akin to that of the new OS/2 programmer looking for that printed documentation.

Data organization evolved from sequential files to hierarchical databases, such as IMS, to relational databases, such as DB2. This evolution fundamentally changed the ways that applications were designed and written.

New techniques and methodologies have evolved and some have become industry standards, such as structured programming and design concepts, online applications technology, and programming development environments such as ISPF.

Mainframe programmers, who made these migrations, had to deal with many of the same uncertainties and technical obstacles as those who are now facing the OS/2 migration. What attributes characterized these successful mainframe transitions?

Long transition periods. None of these changes occurred overnight but evolved gradually, as successes with the new technology became more widespread. Migration, rather than being edicted by management, was spearheaded by "champions" within the programming organizations who were willing to take risks with something new and evangelize the successes to their peers. These champions were very often the youngest or newest members of their organizations; the ones who hadn't developed years of expe-

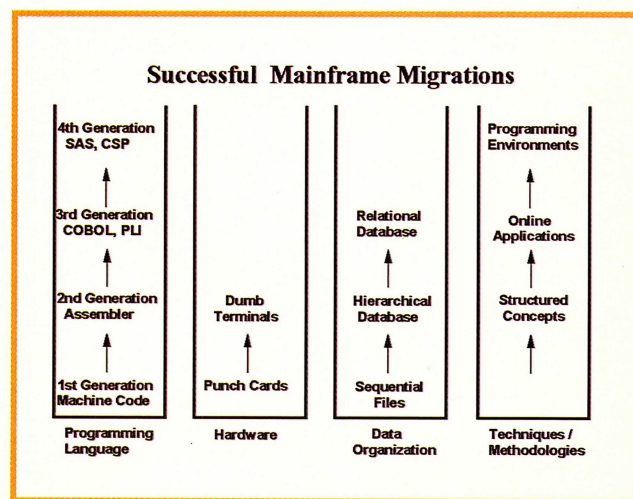


Figure 1: Successful transitions in the mainframe programming environment.

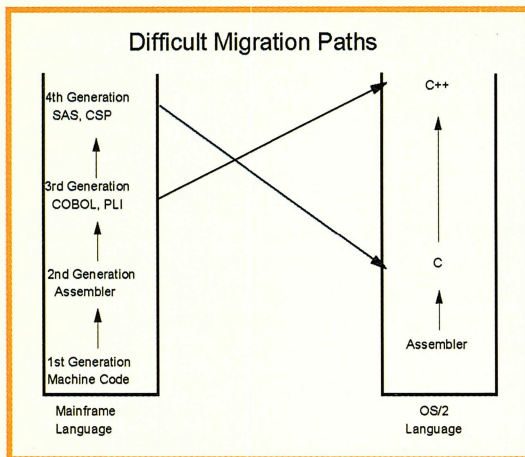


Figure 2: Typical but difficult migration paths from the mainframe.

rience with the old ways. The world was created in six days, but there wasn't an installed base to migrate.

Limited scope. The mainframe migrations only affected one aspect of the programming environment. A programmer migrating from assembler to COBOL, for example, only had to change the language being used, not the hardware and data storage as well.

Easily understood benefits. Each of these migrations had a benefit that could be succinctly stated and measured as more experience was gained. The economic or productivity gains were visible, obvious, and exciting to participants and nonparticipants alike.

Moving to OS/2

The attributes characterizing the mainframe-to-OS/2 migration differ from those listed above due to the changing business environment and the very nature of the transition. These two factors combine to make the change both necessary and more challenging. In this era of corporate downsizing (especially within the traditional IT department), fewer people are willing to take risks, the influx of new people into the organization has been curtailed, and it's harder to justify needed outlays of capital for new hardware, software, and education. You also can't spend years with a gradual transition, not if you're to keep a programming organization current with today's rapid advances in application development technology.

Migration to OS/2 affects all the aspects of programming shown in Figure 1—most of them significantly.

However, many of the real benefits in moving to OS/2 become evident only when a certain level of experience is reached and the uncertainties of the transitional state are overcome.

Another issue in moving established mainframe programmers into the OS/2 environment is that not only are the data and applications distributed, but so is the expertise. The programmer is no longer the repository of all computing knowledge. Easy-to-use products and the explosion of available PC literature have created experts throughout the business organization.

For example, productive business use of PCs originated in the financial groups, not in the IT organizations. Their pioneering of spreadsheets is what transformed the PC from a hacker's tool to a business need. Now, those financial users are computer experts in their own right.

In *Culture Change and the New Paradigm*, John A. Zachman describes a simple theory of change, whereby three options exist for effecting change in an organization. To go from State 1, where the organization is today, to State 2, where you want it to be tomorrow:

- Increase the pain of State 1
- Decrease the uncertainty of the transition stage
- Increase the desirability of State 2.

The last option, increasing the desirability of moving to an OS/2 programming environment, is the one that gets the most focus and which may not overcome the technical, educational, and emotional challenges encountered. We need to spend more attention on increasing the pain of staying on the mainframe and decreasing the uncertainty of getting to OS/2. Fear and reward are the basic reasons people do things; both need to be in our repertoire.

Increasing the mainframe pain

Increasing the pain of State 1

reminds me of this story about my old Uncle Ernie. Ernie is not what you'd call a high-tech man; he doesn't believe in anything invented after 1960. He never saw the need for a VCR, an answering machine, or a microwave oven. He won't use an ATM machine. In fact, if Uncle Ernie can watch his two favorite TV shows, "Wheel of Fortune" and "Jeopardy" each evening, he's totally content. One unfortunate day, the local TV stations juggled their schedules with the result that those two shows were broadcast at the same time on two different channels. What did Uncle Ernie do? He bought a VCR immediately. Did VCRs suddenly get cheaper or easier to use? Of course not. The pain involved in not having one became too great, and the change was made.

In some ways, the job of increasing the pain involved in continuing to be a mainframe programmer is being accomplished by external events. Nearly all the recent advances in application development technology are being offered exclusively on PC and workstation platforms. Headlines in the trade press such as "Fire Your Software Programmers" and "Endangered Species," though somewhat inflammatory, accurately describe current trends in the industry.

Ensure that your mainframe programmers are aware of these developments. The message to them should be that, in a rapidly progressive field like ours, they must change with the times or risk obsolescence.

Another way to inflict pain on those who refuse to even consider OS/2 is to offer something so wonderful on that platform that continued life on the

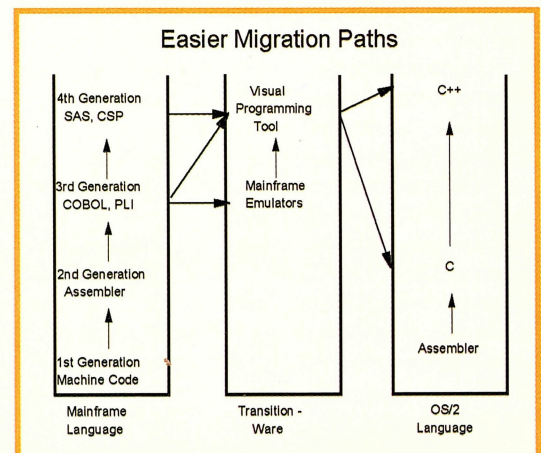


Figure 3: Easier migration using Transition-Ware.

mainframe seems bleak and unimaginable. A GUI or graphical editor probably won't be a big draw for these people. Try the Web Explorer instead. Find out what their main interest in life is and guide them to the corresponding Web site. I converted a life-long MVS bigot to OS/2 overnight merely by directing him to the New York Giants' Home Page. Once the OS/2 ice has been broken, transition to real work-related products is easier.

Decreasing the uncertainty

The objective is to counteract the resistance and fear many people express when asked to change the way they do their jobs. Change implies failure to some, and those who prospered in the mainframe world are not eager to see its demise. The people in the organization responsible for making this change happen have not only to be good technicians and planners, but also psychologists and babysitters at times. The strategy for overcoming this fear consists of using "Transition-Ware"; selecting an appropriate tool suite; finding entry-level projects; increasing education; and disbursement of OS/2-capable hardware.

Transition-Ware. The careful building of a suite of OS/2 development tools can go a long way towards decreasing the uncertainty of moving from the mainframe. Figure 2 shows two typical but difficult migration paths. Migrating from a fourth-generation language on the mainframe to a low-level language, such as C, requires skills long since forgotten or never learned. Pointers, memory allocation, and the relatively low level of programming required, when using Presentation Manager API calls in Presentation Manager, can be rather daunting. Similarly, migration from mainframe COBOL to an object-oriented language like C++ requires changes, not only in language syntax, but also in conceptual thinking about how to get the job done.

The paths depicted in Figure 3 provide an easier migration. Transition-Ware provides a stepping stone for the mainframe programmer and comes in two types: mainframe emulators and visual programming tools.

Mainframe emulators might be as simple as OS/2's EPM editor with a

transparent upload/download capability, or as complex as products offering the OS/2 equivalents of an entire mainframe programming development environment, such as ISPF or CICS. COBOL, PL/I, CSP, and REXX programmers can be offered the same language on OS/2 as on the mainframe; DDCS and DB2/2 can provide transparent access to mainframes or OS/2 databases by using familiar SQL calls, and several OS/2 library control products will integrate with those on the mainframe.

The other Transition-Ware category is visual programming tools. Although these products do require some training and new skills, the transition time is relatively brief, and mainframe programmers are able to create working applications on OS/2 very quickly. The most effective type of visual programming tools for the OS/2 beginner is the one that generates C or C++ code. These products not only provide quick working applications but are also a good educational opportunity. By using the visual portion of the tool to create changes in the application, the programmer can see the resulting

change in the generated code, thus providing a basis for the understanding of the new language that will inevitably be needed when a more sophisticated function is added to the application being built.

Selecting an OS/2 tool suite. A suite of OS/2 development tools offered to mainframe programmers should include Transition-Ware as well as a number of other "wares." Be sure the number of tools is limited to those recommended by the people responsible for creating and supporting the tool suite—you don't want everyone picking and choosing their own tools. Offer the suite as a set of icons in a folder, which can easily be installed on the OS/2 desktop.

The suite's specific components are not as important as the types of products. They should accommodate the gamut of existing working environments on the mainframe. They should integrate easily with each other and with their counterparts on the host systems. Once the categories of needed tools are identified, a set of criteria should be agreed upon for the selection

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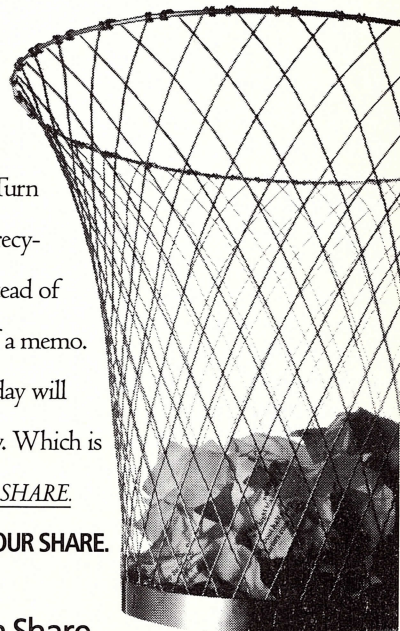
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Ten Steps to a Successful OS/2 Migration

1. Understand the existing mainframe environment, processes, and business drivers.
2. Identify the sources of resistance and fear.
3. Spread the word about trends in the programming profession.
4. Build an OS/2 development environment tailored to fit the organization with appropriate Transition-Ware.
5. Develop a plan for acquiring, disbursing, and providing access to OS/2-capable hardware.
6. Uncover the agents of change within the organization.
7. Start small—be realistic about expectations.
8. Publicize success stories and gain management support by building on these successes.
9. Seed key projects with agents and the converted.
10. Supply education in the proper format and at the proper time.

process. These criteria will vary according to the specific needs of the organization and will probably include cost (both purchase and maintenance costs), existing expertise and experience, organizational strategic direction, required learning curve, run-time license requirements, compatibility with existing development environments, available support, and vendor reliability.

Creating starter projects. If you provide it, will they come? Now that the suite of OS/2 development tools is created and made available, what happens next? Without any further encouragement, a few, select self-motivated individuals will start using the tools. A certain percentage of this small group will be hackers who will play with some of the available products and then go on to other things, communicating their experiences to no one. An even smaller percentage will attempt to use the suite to do something constructive. These are the agents who need to be identified, nurtured, and encouraged to spread the word throughout the organization.

It's important that the first projects are small in scope, but definitely necessary work that is important to someone. This could include an OS/2 front end to an existing mainframe system or a spreadsheet with database access—something to initiate the front line into life on OS/2 and determine which products will benefit the larger organization. Follow-up projects might include putting some common code segments or modules together that are specific to systems being maintained on the mainframe, such as date conversion routines for your fiscal calendar. Each success should be widely publicized, with some

visible management support. The suite of products and accompanying processes can then be refined through the results of experience.

Once a skill base and application set have been established, the next step in completing the transition is to begin implementing the leading-edge technology that makes use of OS/2's strengths: object-oriented programming, the System Object Model (SOM), multimedia, reuse, distributed processing, and multiplatform development.

Education. While these entry-level development efforts are underway, an education plan should be put in place. Use the knowledge of the existing mainframe programming environment to establish a migration path from each set of working processes and skill bases, similar to those in Figure 3. The use of "desktop" education—modules that a programmer can go through with his own PC—are effective, as long as an expert is available to answer questions. Desktop education is commonly available via CD-ROM or the Internet. Another alternative is a series of two- to four-hour classes that offer overviews on products or aspects of OS/2. These classes provide a jump-start on the subject as well as a set of references and contacts that the programmer can pursue back at the workstation.

Traditional classroom education should be reserved only for kicking off large staffed development projects. Consider bringing in outside help for such classes, which can add a necessary expertise and credibility to the education process. Keep in mind that some of the skills needed in creating applications in the new world of OS/2, such as interpersonal and negotiating skills, are not easily taught. This may be thought

of as more of an awareness process than a skills-learning process.

Deploying OS/2 hardware. Acquisition and disbursement of PCs with enough resources to be able to support an OS/2 development environment is a vital part of the migration strategy. Many software products on the market now require a 486 processor and 24 to 32MB of memory. Don't try to save money by scrimping on processor power, memory, or disk space. It's unrealistic to expect novices to become excited about OS/2 programming when their systems are underperforming.

Once the organization has some successes with OS/2, lobby your financial people to replace about a fifth of your PCs each year. This assures that your hardware stays current and also fits in nicely with the depreciation schedule.

And that's it!

In time, your former mainframe programmers will be extolling the virtues of OS/2 and wondering why they didn't make the transition sooner. Who could ask for anything more? Well, except for new tools and faster graphics boards, and maybe some more RAM. **OS/2**

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John Montgomery works for IBM's Microelectronics Division as an advisory programmer in Information Solutions and Integration, which is responsible for growing and supporting the use of OS/2. He holds two patents for advancements in GUI technology using OS/2 and can be reached via the Internet at jmontgomery@vnet.ibm.com.

Lock and Load!

CENTRALLY MANAGING, SECURING, AND DELIVERING AN OS/2 DESKTOP OVER ANY LAN **BY ERIC OSMANN**

OS/2 has become a corporate workhorse since its inception several years ago. Yet many questions have arisen on how to manage the workplace shell and, most important, secure it and the applications it helps launch.

There are a few tools which advocate their ability to manage the shell - most work best in a stand-alone mode. Still, the corporate environment demands efficient centralized management and security optimized for networks. This requirement, combined with my background in development of the OS/2 workplace shell, has led to a careful examination of OS/2 security and commitment to The Desktop Observatory by Pinnacle Technology. This paper discusses the requirements and the features built into Pinnacle's unique technology.

Requirements

Although pure file level security requires IBM's Security Enabling Services (Pinnacle has been a member of Beta efforts and is architected to support these key features already available for 2.11), there are critical elements in OS/2 security that go well beyond the simple ability to restrict right mouse button options. These include: 1) ease of creating desktops; 2) network design; 3) additional security elements; and 4) flexibility.

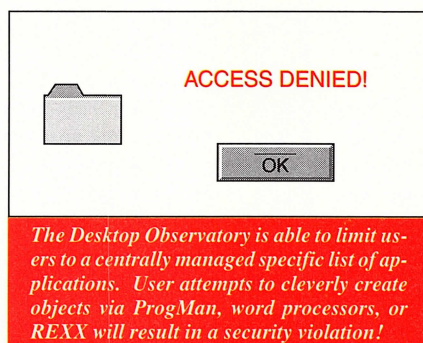
Ease

Pinnacle has developed a powerful SOM based tool called "Finder". Finder allows an administrator to quickly create a desktop, snap a picture of it (including all of those oblique DOS settings) and save it to Pinnacle's bandwidth-sensitive file (patent pending). Files can, of course, be saved anywhere on the network and instantly be built at any machine. There is no need for an administrator to know REXX, although those who do will appreciate Pinnacle's ability to associate

"events" (programs, etc.) with objects and the pure speed at which it builds desktops.

Network Design

The Desktop Observatory was designed with networks in mind. Administrators will appreciate Pinnacle's small file size of less than 10k per desktop and its ability to work over any protocol and NOS. With this bandwidth, lap tops can be secured over a phone line!



Another feature of the Desktop Observatory is that it allows administration of OS/2 clients with the current security server for network based applications. Regardless what NOS is being utilized by a firm, The Desktop Observatory will not build an object unless it can resolve its security checks. It cannot resolve these check unless users are correctly authenticated. The result is a user gets his/her appropriate desktop *whenever and wherever* they log on and the administrator does not have to redundantly maintain rights. No desktop need be provided until *after* a user has been authenticated (those interested in Single Sign-On should contact Pinnacle).

More on Security

Auditing is a common requirement for the security conscious. A full capability is built into The Observatory. This is integrated with the security daemon which includes the ability to restrict clever users from building their own objects to violate client security. Also, great pains are taken to reduce all exposures between power-on and the workplace shell. A special program was created to start

the shell (dskshell.cmd), insure networking starts correctly, and inhibit user's ability to interrupt the process via a `cntl-break`. Disabling the Alt-Fx function is a feature that can be engaged, if desired. Users can enable their hardware boot protection in the bios or call Pinnacle for a centrally distributable software solution.

Flexibility

There are circumstances where corporations do not need high security and only need the ability for users to get the appropriate desktop. In fact, this may be combined with the need for users to be able to modify their own desktop yet move from machine to machine—or what some customers refer to as a "follow me" desktop. Pinnacle uses MID (Mobile Independent Desktops) to provide this flexibility. MID simply utilizes the Finder function mentioned earlier to "snap" the desktop at log off and save the appropriate file to the network so it can be delivered at the next log on. This process applies to PowerPC desktops as well (the Observatory is provided on the PowerPC-OS/2 Application Sampler). End Users should not care what type of OS/2 machine they log onto and with Pinnacle's technology they don't have to.

Summary

Whether you are interested in security or centralized management and delivery of OS/2 desktops, the technology available through Pinnacle can save a great deal of heartache and headaches.

Pinnacle Technology, Inc. was founded in 1992 to bring four key elements to OS/2: 1) Centralized Management; 2) Security; 3) user-proof; and 4) bandwidth sensitivity. Pinnacle's unique means of efficiently delivering desktops (patent pending) is used on over 100,000 OS/2 workstations worldwide. Current products include The Desktop Observatory V4 (centralized desktop management and security), The Desktop Commander (centralized desktop management), and Kid Proof/2 (for stand-alone machines). They can be reached at (800)-525-1650, (317)-279-5157, www.pinnacletech.com, or ehenning@pinnacletech.com.

Eric Osmann was a member of OS/2 Workplace Shell development team at IBM and left in late 1995 to lead development at Pinnacle Technology, Inc. He resides with his family in Colorado Springs and can be reached through electronic mail at helpdesk@pinnacletech.com.

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Hacking the OS/2 Migration Database

Don't like OS/2's default settings for DOS and Windows applications?
Go right to the source! By A. Jack Turner

The words on the side of the blue OS/2 Warp box read, "Includes DOS and Windows application support." OS/2 provides DOS and Windows applications a uniquely tailored operating environment, in effect, giving each its own *autoexec.bat* file and *config.sys* settings. In fact, the degree of configurability for each program can be staggering.

Fortunately, OS/2 contains a database that recognizes many popular programs and tailors the settings for you. It's done automatically whenever you double-click on the **Add Programs** icon, run *migrate.exe* from an OS/2 command prompt, or create a program object using a template. Each time that the **Add Programs** option is run, OS/2 records all the programs it migrates in a file named *database.hst* in the *\os2\install* directory, allowing the migration facility to offer the **New** option on the Select Programs summary screen.

When OS/2 doesn't recognize a program—that is, when it's not listed in the database—it uses certain default settings to create the program object. These factory-assigned defaults are frequently not optimized for running a specific program, and many people have discovered the dubious pleasure of manually changing a program's DOS and Windows. This might be fine for an unusual situation, but if you're in charge of installing applications on many machines, you might want to create your own customized version of this database, which contains your preferred settings for known programs or your tested settings for applications that OS/2 knew nothing about.

Known alternately as the Add Programs database, the migration database, or the OS/2 recognition database, the *database.dat* file in the *\os2\install* directory is a compiled list of all programs that OS/2 recognizes. It includes information about the program to allow accurate identification and the proper settings for each particular program.

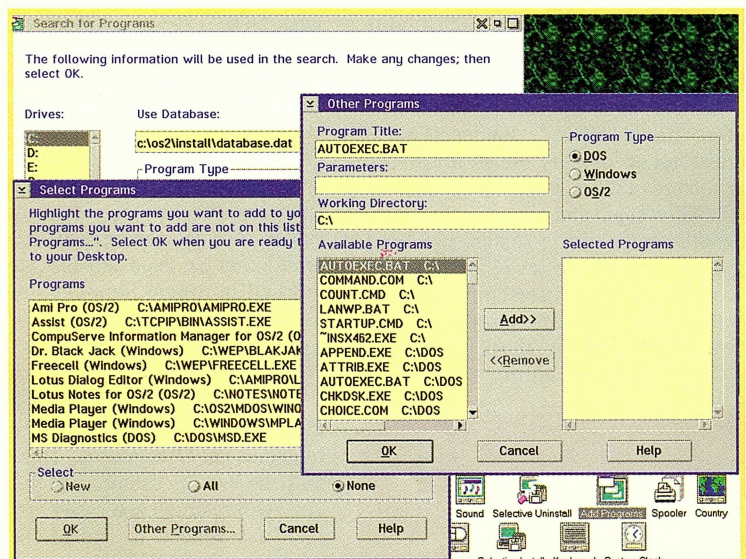
IBM has provided a way for you to make OS/2 aware of a wider variety of programs, but it takes some work. In the same directory as *database.dat* is a file named *database.txt*, which is a pure ASCII version of the migration database. You can edit this file yourself, then recompile it into the OS/2-friendly *database.dat*. From there, you can use the customized migration database as a group resource,

maintaining a central copy and distributing updates whenever necessary, or using it whenever you're setting up a new OS/2 workstation.

Format frenzy

You can figure out the format of *database.dat* quite easily just by examining its contents. However, you won't need to guess, since also in this same directory is a file named *dbtags.dat*, which defines the database's fields and is used when compiling *database.txt* into *database.dat*. Listing 1 shows a portion of this file. This ASCII file is used by the compilation program and lists the various data items contained in the *database.txt* file, the type of data expected (BOOLEAN, STRING, MULTIPLE STRING, INTEGER, and BYTE), a brief description of the more obscure settings, the default values, and the acceptable range of values for each item.

When adding a new program to *database.txt*, make sure to place it in the correct section: The file starts with DOS programs, followed by Windows, and then OS/2 programs. Leave a blank line between entries. The easiest way to get the formatting correct is to copy a current section and modify it with



OS/2's built-in migration utility uses the migration database to create objects with the right settings for specific DOS, Windows, and OS/2 programs.

Listing 1: Beginning of the dbtags.dat file.

```
//      ^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^
//      3 DO NOT EDIT THIS FILE UNDER ANY CIRCUMSTANCES! 3
//      ,^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^
// -----
1  REM                      NOP
// -----
// "Fake" settings for migrate.exe
// -----
2  NAME                      STR      // Filename used to execute application
3  TITLE                     STR      // Icon (desktop) title
4  TYPE                      BYTE     // Application type
                                   // Valid settings: DOS

//      Windows
                                   //      OS/2
                                   //      custom (for Microsoft
                                   //      Windows apps which
                                   //      must run full-screen)
5  ASSOC_FILE                STR      // Associated file (NULL if one isn't
                                   // known)
6  DEF_DIR                   STR      // Default installation directory (NULL
                                   // if there isn't one)
7  FOLDER                    STR      // Name of folder to create and/or put
                                   // the application icon in
8  PARAMETERS                STR      // Application's command line parameters
9  WORK_DIR                  STR      // Application's working directory
10 WIN_FILES                 STR      // Files to be copied to the WINOS2
                                   // directory when the application is
                                   // migrated
11 COMMON_SESSION            BOOL     // Default: ON -> the application is to
                                   //      be run in the common
                                   //      session
                                   //      OFF -> the application is to
                                   //      be run "standalone"
12 WIN_RUNMODE               STR      // Valid settings: AUTO
                                   //      STANDARD
                                   //      ENHANCED
                                   //      FULLSCREEN
13 SESSION_MODE              STR      // Valid settings: FULLSCREEN (DOS Only)
                                   //      WINDOWED (DOS Only)
                                   //      PM (OS/2 Only)
// -----
// Real DOS settings.
// -----
14 COM_DIRECT_ACCESS          BOOL     // Default: off
15 COM_HOLD                   BOOL     // Default: off
16 COM_RECEIVE_BUFFER_FLUSH   STR      // Valid settings:
                                   //      NONE (default)
                                   //      ALL
                                   //      RECEIVE DATA INTERRUPT ENABLE
                                   //      SWITCH TO FOREGROUND
17 COM_SELECT                 STR      // Valid settings: ALL (default)
                                   //      COM1
                                   //      COM2
```

cont'd on p. 30

Listing 1: Con't from p. 29.

```

// COM3
// COM4
// NONE
18 DOS_AUTOEXEC STR // Default: X:\AUTOEXEC.BAT
19 DOS_BACKGROUND_EXECUTION BOOL // Default: on
20 DOS_BREAK BOOL // Default: off
21 DOS_DEVICE MLSTR // Default: empty
22 DOS_FCBS INT // Limits: 0 to 255, default 16
23 DOS_FCBS_KEEP INT // Limits: 0 to 255, default 8
24 DOS_FILES INT // Limits: 20 to 255, default 20
25 DOS_HIGH BOOL // Default: off (correction: 0/1)
26 DOS_LASTDRIVE STR // Limits: last physical drive to 'Z',
// default 'Z'
27 DOS_RMSIZE INT // Limits: 128 to 640, default 640
// NOTE: increments of 16
28 DOS_SHELL STR // Default: ":\OS2\MDOS\COMMAND.COM "
// ":\OS2\MDOS\ /P" where #
// is the boot drive
29 DOS_STARTUP_DRIVE STR // Default: empty
30 DOS_UMB BOOL // Default: off
31 DOS_VERSION MLSTR // Default: DCJSS02.EXE,3,40,255
// DFIAOMOD.SYS,3,40,255
// DXMAOMOD.SYS,3,40,255
// IBMCACHE.COM,3,40,255
// IBMCACHE.SYS,3,40,255
// ISAM.EXE,3,40,255
// ISAM2.EXE,3,40,255
// ISQL.EXE,3,40,255
// NET3.COM,3,40,255
// EXCEL.EXE,10,10,4
// PSCPG.COM,3,40,255
// SAF.EXE,3,40,255
// WIN200.BIN,10,10,4
etc...
```

your values. However, before you start, I suggest that you backup any and all files that you edit and store the original files in a safe, off-line location—just in case.

To manually create an entry, start with **REM**, followed by a space and a

series of dashes. On the next line, start with **REM**, followed by a space and the program name, version, and publisher. This data is included for identification purposes to allow for future updates. If there are any program notes that you wish to make to future readers of this

file, they may be added next, each line preceded by a **REM** and a space. The final line of this introductory section repeats the first line with **REM** and dashes.

The remaining parameters are indented by four spaces and are not case sensitive except for the **TITLE** parameter, which is used as the Icon (desktop) title. The "fake settings" section of the *dbtags.dat* file lists 12 settings; the **NAME**, **TITLE**, **TYPE**, **ASSOC_FILE**, and **DEF_DIR** settings are required for every entry. The next section lists the **Real DOS** settings that work with your program. In this section, you don't need to list every parameter, only

Listing 2: Sample addition to the *dbtags.dat* file.

```

65 AUDIO_ADAPTER_SHARING STR // Valid settings: REQUIRED
(default)
// OPTIONAL
// NONE
66 SESSION_PRIORITY INT // Limits: 1 to 32, default 1
67 WIN_CLIPBOARD BOOL // Default: on
68 WIN_ATM BOOL // Default: on
```


Listing 3: Sample addition to the database.txt file.

```
REM -----
REM dBase 5.0 for Windows by Borland
REM -----
NAME                                DBASEWIN.EXE
TITLE                              dBase 5.0 for Windows
TYPE                               WINDOWS
ASSOC_FILE                         DBASEWIN.FNF,DBASESQL.TXT
DEF_DIR                            \DBASEWIN\BIN
AUDIO_ADAPTER_SHARING              OPTIONAL
SESSION_PRIORITY                   32
WIN_CLIPBOARD                      OFF
WIN_ATM                            ON
MOUSE_EXCLUSIVE_ACCESS             OFF
COMMON_SESSION                     ON
KBD_ALTHOME_BYPASS                 ON
VIDEO_8514A_XGA_IOTRAP             OFF
VIDEO_SWITCH_NOTIFICATION          ON
DPMI_MEMORY_LIMIT                  64
WIN_RUNMODE                        ENHANCED
INT_DURING_IO                      OFF
VIDEO_RETRACE_EMULATION            ON
```

those which must be different from the default values for the program to run.

With a few exceptions, most items only allow one parameter. **ASSOC_FILE** and **WIN_FILES** may list more than one file on one line, separated by commas. **WIN_RUNMODE** allows multiple options. The only examples in *database.txt* are **FULLSCREEN** and **ENHANCED**, on separate lines. **DOS_DEVICE** and **DOS_VERSION** may list more than one item, each on a separate line.

The **DOS_AUTOEXEC** file need not end in *.bat*; you may use any file name that you like, such as *autoexec.win* for Windows applications.

After you make the changes, you can compile the *database.txt* source file into *database.dat* format with this command, run from an OS/2 command windows:

```
PARSEDB DBTAGS.DAT
DATABASE.TXT DATABASE.DAT
```

Adding settings

Not every possible OS/2, DOS, and Windows setting is included in the *dbtags.dat* file. The only standard DOS and Windows settings not listed are **SESSION_PRIORITY**, **WIN_CLIPBOARD**, and **WIN_ATM**. If you have a sound card, you might be surprised to

learn that *dbtags.dat* does not list **AUDIO_ADAPTER_SHARING**. Therefore, if you try to compile the *database.txt* file with one of these parameters listed (to override the defaults), compilation will not be successful.

Is that necessary? Is there a reason why those parameters aren't listed in *dbtags.dat*? Why not find out?

Before we continue, I'd like to point out that the top of the *dbtags.dat* file (Listing 1), contains a disclaimer, "Do Not Edit This File Under Any Circumstances!" Therefore, if you decide to follow my experiments below, it is entirely at your own risk. If you *do* decide to hack the migration database, don't forget to make a complete set of backups of all relevant files.

Being an adventurous soul, I added the parameter data in Listing 2 to the bottom of my *dbtags.dat* file. As a test, I then added test data for Borland's dBase 5.0 for Windows to *database.txt*, attempting to change those four parameters (Listing 3). Using the steps above, I completed recompiling *database.dat* with no errors. But would it work?

Since the parameters for the four items were set other than defaults, it would be easy to tell. I ran Add Programs, and OS/2 found dBase 5.0 for Windows. I selected it and told OS/2 to

migrate it, and it created a new icon in my Windows Programs folder. Success so far; but only partial success later: Opening dBase's **Settings** notebook showed that the **SESSION_PRIORITY**, **WIN_CLIPBOARD**, and **WIN_ATM** settings migrated correctly, but **AUDIO_ADAPTER_SHARING** did not. Well, three out four isn't bad.

Practical applications

Why would you want to add those additional parameters to *dbtags.dat* or update the migration database source file's *database.txt*? After all, once you've already manually tweaked an application's settings for your workstation, there's little reason to remigrate it.

As previously mentioned, IS departments, developers, and consultants might want to use customized versions of *database.dat* to automate the installation of unsupported shrink-wrap or custom-written applications on multiple workstations, or to override IBM's suggested default settings, especially when there are known conflicts with hardware or other software. An even better reason, however, would be to make those changes known to the rest of the OS/2 community. I am starting a central repository of updates to the migration database. These additions and corrections will be compiled on a regular basis and made available to anyone requesting a copy. This will allow OS/2 to recognize a wider variety of programs and, hopefully, IBM will include the updated *database.txt/dat* files in future versions of the operating system. Now if only IBM would let OS/2 automatically assign program-specific icons to DOS programs! In any event, here's yet another example of where OS/2's extensibility goes beyond even what IBM anticipated—and that's good news for OS/2 users all around. Please forward your comments, additions, and corrections to one of my E-mail addresses shown below. **OS/2**

Jack Turner has been an OS/2 user since version 2.0. He recently retired from the U.S. Navy and is looking to start a new career. Jack is a part-time OS/2 consultant and a member of the San Diego OS/2 user group. He can be reached via the Internet at ajturne@ibm.net or Compuserve at 76600,2553.

Securing the OS/2 Workstation

Desktop security doesn't mean a screen saver's password. By John R. Vacca

Chances are that you and your colleagues, clients, and customers are running critical applications and working with confidential information which, in the wrong hands, can cause corporate embarrassment, financial loss, or something even worse. If that's the case, you need to protect and secure your workstation from unauthorized access. If you're involved in your company's information technology (IT) department, you may be facing dozens or hundreds of unsecured workstations.

Securing the OS/2 workstation is one of the greatest problems facing corporate IT managers today. Corporate management has had to grapple constantly with this problem, trying to find the ultimate corporate security solution—and no, it's not easily breakable passwords in screen savers. The ultimate OS/2 workstation security solution would also have to meet various governmental or large-company standards, like government-mandated C2 compliance.

The problem is that the ultimate security solution does not exist today. In these days of the malicious hacker or professional industrial spy, the best one can hope for is an ounce of prevention. Numerous vendors that cater to OS/2 workstation security promise the "ultimate solution," but in reality only have tools that can offer the IT manager or concerned professional a temporary solution.

Security is important for the effective enforcement of security policies for the OS/2 workstation. Such technology is especially important in a highly distributed networked environment, such as the Internet, where protective measures exist for physical and administrative controls.

Securing your OS/2 workstation involves a number of protective and detection measures. The idea is to keep the workstation and data safe from harm or exposure, and to also be able to detect an intrusion or misuse of data if it occurs. It's a matter of seeing that the workstation is physically safe, secure from impostors, secure from intruders, capable of detecting intruders should they get in, and capable of protecting the privacy of confidential data. The most common protective and detection measures fall into four categories: intrusion detection, authentication, physical security, and access control.

Many of these measures have nothing to do with OS/2 itself but are common to all personal computers or even data centers. Nearly all workstations are vulnerable to the same types of dangers.

Intrusion detection

An OS/2 workstation that is connected to a network could be

subjected to both internal and external attacks. Therefore, intrusion detection is important because if there is a break in, it can be stopped quickly, and damage control can be initiated immediately. Intruders try to avoid detection by such methods as deleting audit trails and doctoring logs. Remember, however, that if one hacker finds a weakness, that vulnerability will be rapidly known throughout the hacker community.

Penetration testing is a method of testing the protective mechanisms designed to identify, prevent, or limit infiltration and unauthorized access to IT resources. To ensure that a system is safe, it must continuously attempt to penetrate systems the way an intruder would try.

Regardless of motivational rationale, intrusion is a wrongful, deliberate, and unauthorized act of entry into, or upon; seizure of, or possession of, a property for use; acquisition; or privileged access to proprietary information or resources. Infiltration is one of the intrusion methods employed, often planned and deliberate and exercised by an agent to gain access.

As previously stated, both sophisticated and casual intruders employ techniques to disguise their activities to avoid detection. Intruders, especially those in the hacker community, are formidable adversaries and should not be taken lightly. Nevertheless, tools like Fisher International's Watchdog for OS/2 and Mergent's PC/DACS for OS/2 claim that they can thwart the hacker with such features as data encryption access, multiple-level user permissions, audit trail facility, boot and format protection, and single sign-on.

A hacker's database is extensive, filled with descriptions of exposures techniques, tools, and capabilities for exploiting computer systems on a worldwide basis. IT management is often unaware of intrusive anomalies and penetration activities. In fact, security incidents are normally not widely publicized, because the companies that are penetrated don't want to damage customer or investor confidence in their firms.

Authentication

Authentication of users involves verifying the identity of any person who interacts with the OS/2 workstation. A user ID and password are the obvious forms of authentication. But more than these forms are needed to perform the verification of eligibility of users, machines, or software to access specific information categories. It involves determining whether the seeker of access is truly authorized, and if so, is that seeker authorized for the category of information being sought?

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Data Integrity 2000

Today, a thief can steal far more with a computer than with a gun. Industrial espionage is growing at an alarming rate and is now being monitored closely by governmental intelligence-gathering organizations. Both the FBI and CIA have reported that industrial and technology espionage by foreign powers is now the greatest threat to U.S. security. The CIA is increasing its monitoring and analysis of foreign economic activities particularly in the high-tech areas, concentrating on information about computers, semiconductor devices, and networks. The CIA estimates that 50% of the intelligence needs through the year 2010 will be economic in nature.

Even though industrial espionage has grown to the point where it is now under close review by governmental agencies, the majority of system intrusions and unauthorized accesses primarily remain internally generated and attributable to insufficient testing of deployed safeguards and countermeasures, a false sense of well being, and a misconception or lack of understanding by management of potential and residual risks.

Intrusion and infiltration are not just limited to theft and espionage. Computer virus evolution as a weapon for terror, disruption, grievance, and entertainment has been widely publicized and actively addressed, but the associated intrusion activities have been downplayed. Today, every organization is a target and must protect itself against unwarranted acts of intrusion. Our primary defense strategy must be one of resistance through controlled avoidance.

The results of implementing a penetration testing program provide management with evidence of new or existing vulnerabilities; identification of existing, new, or emerging threats; as well as recommendations for addressing these issues. Penetration testing is designed to provide input into corporate risk-reduction planning efforts and to enhance the quality of the operational readiness evaluation of fielded Internet products and services.

Authentication techniques protect OS/2 workstations and data by controlling access to the assets of the data-processing system. You can use authentication devices, such as the smart card and the smart token. Both devices strengthen the authentication process by functioning in a cooperative challenge and response protocol with system authentication software. Or, you can use message authentication, which enables a receiver to validate that the information originated with a specific sender, the content of the data has not been changed, and the information is delivered to the intended receiver.

Networks connected to the Internet should implement authentication functions that are consistent with the level of confidentiality or sensitivity of the information they contain and process. The following determinations should be made regarding the authentication level that is required for information-processing systems:

- Determine whether the confidentiality or criticality of the information processed by the system requires stronger authentication than passwords alone. If so, consider the appropriate authentication device.
- Determine which transactions re-

quire that messages be authenticated.

- Determine whether third-party authentication is required for effective authentication in distributed environments.

Authentication control tools provide the OS/2 workstation with password protection, message authentication, and data encryption. Trusted third-party authentication services are implemented as specialized secured servers in networks employing the client/server architecture. These servers are used to authenticate clients and their respective servers to each other in a manner that avoids passing readable authentication information across the network.

Access control

Owners of information should establish authorized access to their data and designate authority to read, write, modify, update, or delete specific data. Specific access authority should be established when an individual is assigned a password, and then controls ensure that users may not access software or data unless they have been granted the authority.

If software can't control access to segregated parts of information within the OS/2 workstation, access to the en-

tire computer system should be restricted to those with permission to access all the information. Violations of access controls should be reviewed by both the owner and the user's manager.

If access control software is incapable of preventing programmed attacks on the information, all program compilers or assemblers and all general-purpose utilities capable of reading or updating files should be partitioned or removed from the system.

Each organization should establish appropriate internal policies and procedures to protect all classes of information. After an organization's internal security policies and procedures have been established, they must be enforced. Only then will employees recognize that information security is significant, and that it is a management priority. Employees who fail to observe security requirements should be subject to disciplinary measures.

In recent years, a number of social, economic, and technical advances have converged to create a dramatic increase in the number of users accessing networks remotely. A partial list of causes fueling this revolution includes:

- new standards for high-speed data transfer over telephone lines, such as V.34, ISDN, and ATM
- falling costs of both modems and long-distance telephone service
- advances in the power and miniaturization of portable computers
- greater public awareness of the potential of e-mail and networks
- greater corporate acceptance of telecommuting
- better digitization of information.

All these factors have led to a proliferation of modems and dial-in computing. According to U.S.-based researcher Forrester, more than 25 million professionals are working away from their offices in the United States, and many of these workers access corporate networks via modems.

This dramatic increase in remote access is putting a great strain on network security systems. In the past, most corporations' information security revolved around guaranteeing that only authorized users could access the system. Such security methods were generally confined to physical security at the workplace, such as employee

badges, ID cards, and password protection for logging in to the network.

Access security tools all provide access rights to be granted or denied to users of an OS/2 workstation. The tools also perform security tasks that monitor the OS/2 workstation to ensure data integrity, perform user identification, record system access and changes, as well as grant access to users.

Although these types of access security tools can be effective for local workstations, they are inadequate for remote workstations, where the user is invisible and the communication link may be vulnerable to eavesdroppers. All the leading players in the remote access field—network operating-system manufacturers, telephone companies, and modem manufacturers—are moving to fill these security holes, but none of these vendors provides a complete, integrated solution.

Remote access means use of network resources from a remote OS/2 workstation location, via a communication link. Typically, the communication link is a temporary telephone connection, but it could also be a leased line or wireless connection using a cellular network. The problem is that a remote user is invisible, and, therefore, invulnerable to workstation security measures. Remote access also exposes information that is transmitted over possible insecure communication links.

User authentication must be performed so that only valid users can log in. The transmission of their passwords over nonsecure lines is hopefully protected through basic password authentication techniques which encrypt passwords as they are sent over the line.

Encryption protects the data being transmitted over a communications channel from eavesdroppers. Encryp-

tion also uses an algorithm and key to transform data, and one or both are kept secret from outsiders. The receiver must know the key to convert the encrypted data back to its original form.

A firewall is used to prevent users from seeing or accessing various network resources. Domain filtering allows the establishment of accounts for customers but restricts those accounts to only certain network resources. Dial-in users might know the password for a file server, but they can't access the server if the domain filter doesn't permit it.

Physical security

The OS/2 workstation must be physically safe from harm. In other words, physical security means preventing access to computers, networks, and related equipment and their contents through physical limits imposed, such as fences, gates, locks, or other physical

Resources:

AntiVirus

IBM Corp.
(800) 342-6672 or a local IBM sales office
AntiVirus provides install-and-forget protection against viruses in OS/2, Win-OS/2, Windows, DOS, and NetWare computing environments.
READER SERVICE NO. 117

Bootware

Lanworks Technologies Inc.
(905) 238 5528, fax (905) 238 9407
Bootware is a network interface card (firmware) for centralized booting of any IBM-compatible personal computer. The product allows the workstation's boot information to reside on the server, protected from the user, viruses, or other corruption.
READER SERVICE NO. 118

Central Point Anti-Virus for OS/2

Symantec Corp., Central Point Division
(503) 614 7923, fax (503) 614 7985
This product takes advantage of the OS/2 Workplace Shell and offers HPFS support. Its virus analyzer and smartchecks detect and clean unknown viruses.
READER SERVICE NO. 119

DS1410D

Dallas Semiconductor
(214) 450 8168, fax (214) 450 3864
This copy protection and license management hardware and software uses Dallas buttons. It includes a parallel port button holder and software combination that allows software developers to protect applications from unauthorized execution

and also provides license management functions.
READER SERVICE NO. 120

DeskMan/2 Productivity Pack

Development Technologies Inc.
(803) 790-9230, fax (803) 738-0218
This package is a suite of multifunction tools used to administer OS/2 on a PC or LAN. It can be used to install, configure, backup, secure, and manage desktops remotely.
READER SERVICE NO. 121

Desktop Observatory

Pinnacle Technology Inc.
(317) 581-6262, fax (317) 279-8039
This product allows the user to build secure desktops locally or from any network, at startup, logon, or any time and in any language. These centrally administered profiles can be based on a user, group, or a single standard desktop.
READER SERVICE NO. 122

File Secure for OS/2

SoftTouch Systems Inc.
(405) 947 8085, fax (405) 632 6537
File Secure allows files to be encrypted using an encryption key provided by and known only to the operator. Files can only be decrypted by specifying the same exact encryption key.
READER SERVICE NO. 123

HASP-3

Aladdin Software Security
(212) 564-5678, fax (212) 564-3377
The HASP-3 is a hardware-based system that protects

software from piracy and illegal use. It offers transparent secure protection.
READER SERVICE NO. 124

Hardlock

Glenco Engineering Inc.
(708) 808-0300, fax (708) 808-0313
This product is a software protection device that uses an encryption algorithm for protection. Based on a custom chip that uses an on-board algorithm, it gives the user a variable response device for parallel or serial ports, or a floppy board that plugs into a ISA or MCA bus.
READER SERVICE NO. 125

IPL Logger

Softworks Inc.
(301) 856 1892, fax (301) 868 7591
This product allows the user to determine if her machine has been booted while being away. It logs the date and time and includes a facility for viewing the log.
READER SERVICE NO. 126

MacroScope

Objective Inc.
(303) 442-2200, fax (303) 442-3000
MacroScope has a 5GL development environment that consists of libraries of pre-existing objects that manage all the details associated with interfacing today's complex security technologies.
READER SERVICE NO. 127

MultiNet 5100

Diebold Inc.
(216) 489 4148, fax (216) 489 4140

blocks to access. Physical security also means protecting workstations and related equipment from harm by fire, accident, and environmental hazards.

Workstations should be located in secured areas, or the workstation itself should be secured to a desk through such devices as cables, adhesives, or bolts. Access to secure areas should be restricted to properly cleared visitors; access should be monitored, visitors logged, and items such as briefcases or toolboxes should be inspected and preferably retained at the control point.

Regard should be given to the environmental requirements of the OS/2 workstation, (for example, dedicated electrical circuits and adequate ventilation). It's wise to follow some general guidelines when placing the workstation within a building:

- Workstations should be located on

the second floor of buildings, if possible, to reduce threat of water damage from broken water lines, floods, or firefighting, and to reduce the threat of theft.

- Workstations should not be located near the exterior building wall.
- Kitchen facilities should be on higher floors but not directly above key data centers, in case of fire, water, or smoke damage.
- Management reviews of physical security measures should be conducted annually, as well as whenever facilities or security procedures are significantly modified.

Conclusion

The security profession recognizes intrusion as the most significant risk to OS/2 workstations. Proactive management of risk to information resources from intrusion, as well as increased

development productivity, must be maximized without serious impact to business objectivity, creativity, and design innovation. The implementation of corporate security solutions and the trend toward networked systems and open architectures has exceeded the capability of most available safeguards and testing mechanisms to adequately protect OS/2 workstations for any length of time. The ultimate corporate security solution will continue to dangle in front of us like a "carrot on a stick" well into the 21st century. 

John R. Vacca is a freelance information technology and air and space contract writer based in Houston, Tex. He can be reached at CompuServe 74044,164 or Internet jvacca@hti.net. His Web page is at <http://www.commerce.com/ctw>.

Resources:

This product is an OS/2-based electronic security monitoring system that offers alarm monitoring and management, access control, CCTV matrix switching, and photo imaging. It also offers optional Data Encryption Standard (DES) and Message Authentication Code (MAC) line security.
READER SERVICE NO. 128

NC-PASS LAN Server

CKS Inc.
(412) 928 3300, fax (412) 928 3307
The NC-PASS LAN Server uses the mainframe as an authentication server, verifying users against a central point of control (such as RACF). This process allows for ID and password rules to be utilized across diverse platforms, providing single sign-ons to users and a central point of control for administrators.
READER SERVICE NO. 129

PC/DACS for OS/2

Mergent International Inc.
(203) 257-4223, fax (203) 257-4245
This product provides workstation information security solutions for OS/2 PCs, including ID password-based protection, session timeout, encryption, and boot protection. Several levels of data encryption are available.
READER SERVICE NO. 130

PM Assistant

Utilis Inc.
(206) 467 4025, fax (206) 869 4981
With the PM Assistant, the user can use hot-keys and buttons to perform common tasks—bringing applications to the foreground and starting them if necessary. The product also executes menu commands, initializes or changes the settings in dialog boxes, copies data to and from the clipboard and

among applications, and arranges windows on the screen.
READER SERVICE NO. 131

PVCS Version Manager

InterSolv Inc.
(800) 547-4000, fax (301) 984-3047
This product provides software configuration management on the LAN and supports standalone, distributed, and team development in heterogeneous environments (OS/2). It is an integration security tool that supports revision, version, promotion, build, and execution management.
READER SERVICE NO. 132

Secure Workplace

Syntegration
(909) 464-9450, fax (909) 627-3541
This collection of OS/2 Workplace Shell Objects is designed to provide a secure desktop environment by protecting against unwanted changes or intrusions.
READER SERVICE NO. 133

Sentinel Family

Rainbow Technologies
(714) 454-2100, fax (714) 454-8557
This family of hardware-based security locks for software consists generally of a serial- or parallel-port adapter that is keyed to an application's serial number.
READER SERVICE NO. 134

StopLight ELS

Safetynet Inc.
(201) 467 1024, fax (201) 467 1611
StopLight ELS provides full-featured security protection for

OS/2, even when running DOS or Win-OS/2 sessions. Among its security features are hard-disk boot protection with initial user login, multiple user security profiles, password management, audit trail, keyboard lock, screen saver and secure files, directories, floppy drives, and I/O ports.
READER SERVICE NO. 135

VirusNet/Pro

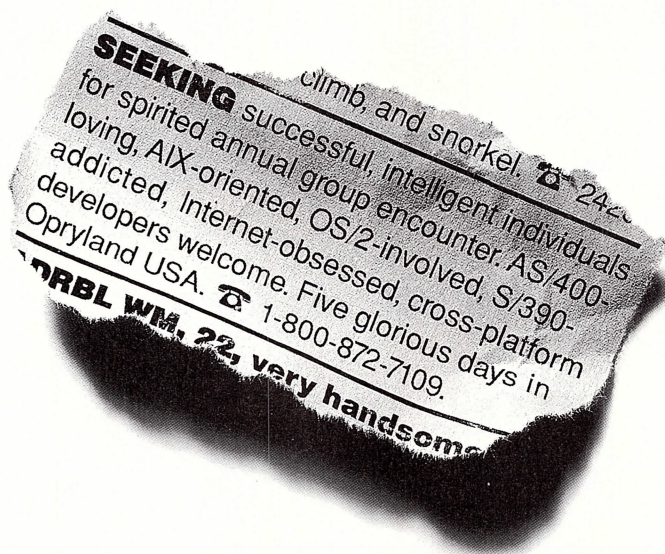
Safetynet Inc.
(201) 467 1024, fax (201) 467 1611
This product provides virus protection and disaster recovery for networks with OS/2, Windows and DOS workstations. It offers automatic workstation updating and scheduled virus scans.
READER SERVICE NO. 136

WPS ShutDown

Creative Systems Programming
(609) 234-1500, fax (609) 234-1920
WPS ShutDown is a shareware product used to shut down your OS/2 system. It's also available from the OS/2 Vendor's Forum (GO CIS:OS2AVEN) on the CompuServe Information Service.
READER SERVICE NO. 137

Watchdog PC Data Security

Fischer International Systems Corp.
(813) 643-1500, fax (813) 643-3772
This product prevents unauthorized use of PCs. It features ID and password access control with a single sign-on feature to LANs, multiple permission levels, audit trail, system boot and format protection, logon execs, object reuse protection, system administration, and virus protection.
READER SERVICE NO. 138



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Not Your Father's C Compiler

Exploring the functions within IBM VisualAge C++. By Lou Miranda

IBM's C and C++ development tools have finally entered the visual programming age with the release of VisualAge C++ 3.0 for OS/2. The big news in this update to IBM's venerable CSet++ compiler is the VisualBuilder tool, which allows you to create object-oriented applications visually with parts by using drag-and-drop. Significant additions and enhancements to the other tools have also been created, including an all new WorkFrame, an enhanced browser and performance analyzer, and a new editor.

Let's examine the new visualage c++ that Visual Age C++ offers over the more spartan CSet++, and how to use them in your own development projects. Chances are, of course, that you're already working on a project, and converting to the visual tools would take too long to be worthwhile. But there's still a lot in VisualAge C++ that can make existing projects go faster, such as the new WorkFrame.

In this article, we'll discuss the WorkFrame 3.0 and the IBM Editor. In the future, we'll learn to use the VisualBuilder tool and to quickly create OS/2 Presentation Manager applications from preconstructed parts.

Not your father's workframe

Chances are, mere mention of the word WorkFrame brings groans from anyone who's ever tried it. Earlier versions of WorkFrame (WF) were very powerful, but were also far too clumsy and difficult to learn. WorkFrame 3.0 has changed all that. WF projects now act very much like OS/2 folders (although they aren't true folders), and it's easy to customize actions for source and make files. It's similar to the integrated development environment that Borland products have always had, though much more OS/2-like.

You can use WorkFrame for new projects created with the visual tools, or you can wrap an old project in new WF clothes. Since you probably already have a project going, and because it'll

make more sense to separate WF from the visual tools, let's try wrapping a current project with WF. By completing this example, you can use WF even if you have your own hand-crafted makefile, or if you have your own automated way of creating makefiles (such as a custom REXX script). This makes it easy to incorporate a current project into WF, without having to convert your current makefile.

Let's say the program you're writing is a bitmap viewer called Image Notebook (INB). Create a WF project for it. Drag the **VisualAge C++ Project Template** from your **VisualAge C++** folder onto your desktop or any open folder. Rename the WF project to **Image Notebook Project**. Double-click the project to open it, and a blank window with two toolbars and a menu will appear.

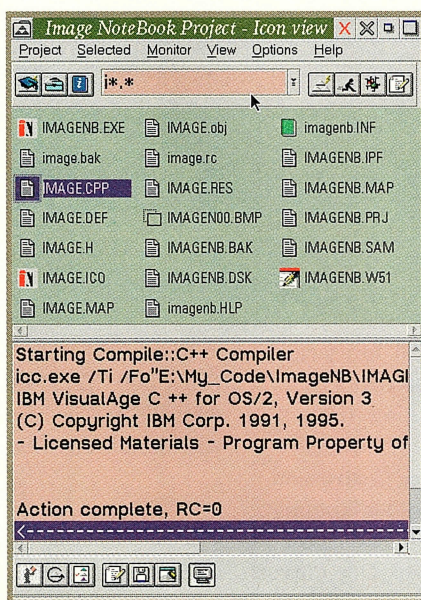


Figure 1: A typical WorkFrame project.

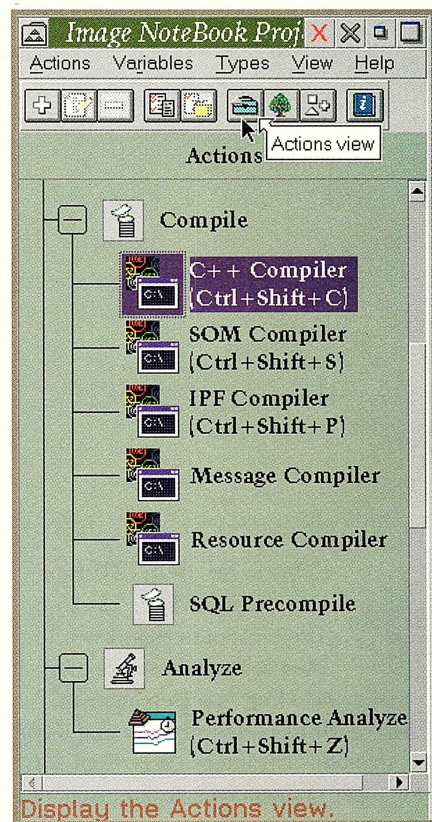


Figure 2: The Tools Setup window in Actions view.

VisualAge C++

The next thing to do is specify the name of the executable file. This way the project knows how to run your program standalone or with the debugger, browser, or performance analyzer. From the menu, select **View→Settings**. Next to **Name**, enter your executable's name (*imagenb.exe*, for this example). You can ignore the **Makefile** entry, since you already have a hand-crafted makefile.

Next, you need to specify the directories that keep your source files and executable. Click the **Location** tab and delete the **Default** Directory under **Source** Directories (you might think it's a listbox, but it's really just an entry field). Enter your project's source file directories by typing them in using the **Find...** button or by dragging folders into the entry field. The directories you enter will be used to fill the project window with file names. At the bottom of the notebook, select the **Working** Directory which, for our purposes, is the directory where the executable is located. Close the **Settings** notebook.

Your project should now look something like Figure 1, except that your bottom window will be empty. The top (project) window is a list of all files in your project, and the bottom (monitor) window will contain the results of any actions you perform on the files.

Let's take a tour of the project. Under the menu is a toolbar that affects the project window. Hover your mouse pointer over each button on the toolbar and bubble help windows will pop up. The buttons on the left are for setup and the buttons on the right are for building, running, debugging, and editing your project. In between is a combo box that lets you specify the type of files to display in the project window.

The files displayed in the project window are real Workplace Shell (WPS) objects. Right-click on a file and the standard WPS file object menu pops up. Appended to the end

of that menu are additional items that are added by your project. Different menu items are added, depending on the file type (C++ source, executable, resource file, makefile, and so on) and the actions that have been defined for them in **Tools Setup**.

At the bottom is a toolbar for the monitor window. If you can't see the monitor window, press the button farthest to

the right to toggle the monitor on and off. These buttons allow you to stop, save, repeat, or edit the actions in the monitor window. You can double-click any compiler error messages in the monitor window and WF will launch the default editor on that file and take you to the proper line.

Building your project

As things stand now, you can edit your source code files and run your executable from within your WF project, and that's about it. If you have a predefined makefile, you can also hit the **Build::BuildNormal** button to run **nmake** on your makefile. But if you have an OS/2 command file or REXX script to create your makefile, you need to do a few more things to integrate it into WF. That's because all the configuration options assume you are using the **MakeMake** automatic makefile generator. Since this is a pre-existing project with your own makefile or script, this is not the case. So how do you build your project?

To build your project, you need to customize your WF project using **Tools Setup**, which is the heart of the configurability of WF. At first it might seem exceedingly complex, and you will curse its quirks. But you'll quickly crest at the "Aha!" stage and really understand the power behind **Tools Setup**.

As I mentioned earlier, each file object in the project window has actions defined for it. Right-click on a *.cpp* file and you can **Edit** or **Compile**; right-click on an *.obj* file and you can **Link**; right-click on an *.exe* and you can **Run**, **Browse**, or **Analyze**. How does WF know which actions can be performed on each file type, and which options it will use? It's all defined in **Tools Setup**.

To add, remove, or change any of the definitions, click on the **Tools Setup** button on the left side of the toolbar. By default it comes up in **Actions** view; it lists all the actions this project has defined (Figure 2). As you can see, each class (such as **Compile**) has related actions (for example, C++ compile and SOM compile), and each action acts on one or more file types that you specify. If you click on the **Types View** button, you'll see a list of file types that are currently defined (Figure 3).

Say we have a custom REXX build script that is called *inbbuild.cmd* that automatically generates our makefile. Let's add a new action to our project: build with our build script. That is, run *inbbuild.cmd* whenever we select **Build→INBBuild** from the **Project** menu.

Go to the **Actions** view in the **Tools Setup** window. Right-click on **Build** and select **Add....** On the first page of the notebook, next to **Class**, select **Build**, which places it under the **Build** section in the **Tools Setup** window. For **Name**, enter "INBBuild". Specify *inbbuild.cmd* as the **Program**; this instructs the action to run our build script when we select this action. For **Session**, select **Monitor**; this places the output from the build script into the **Monitor** window. Under **Action Applies To**, deselect **File** and select **Project**. This tells the action that it applies only to the project as a whole, not to individual files.

The second page of the notebook is **Types**; you can't select

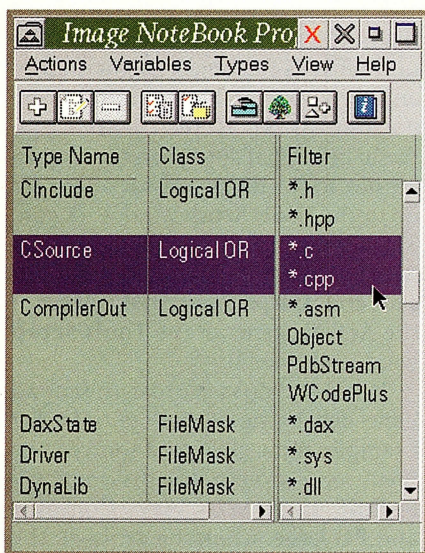


Figure 3: File types defined for this project as seen in **Tools Setup**, **Types View**.

anything here because file types only apply to file-scoped actions, not project-scoped actions. The file types listed are those you see in the **Tools Setup, Types View**. The third page is **Support**; we don't need to change anything here.

The last page is **Menus**. Make sure **Add To Menus** is checked. For project-scoped actions, this action is added to the project's pop-up menu and the **Project** menu; for file-scoped actions, this action is added to the file's pop-up menu and the **Selected** menu. If you'd like, select **Add To Options Menu**. This selection adds this action to the project's **Options** menu so you can edit the **INBBuild** action without having to open the **Tools Setup** window first. Select **Add To Project Toolbar** and it is added to the top toolbar in the project window—only project-scoped actions can be added to the toolbar.

Click **OK** to close the notebook. A new **INBBuild** item should appear under the **Build** tree in the **Tools Setup** window. There's just one more thing to take care of before running the build. By default, WF will pass the name of the project (such as `e:\my_code\image.nb\inbproject`) to your build script. How do you prevent that? In the **Tools Setup** window, right-click on the **Build::INBBuild** item and select **Project Options**. Under **Parameters**, delete the **%p** (which is the project name; you can press <F1> here for a list of replacement parameters). Click the **OK** button.

Go back to your project, select the **Project** menu, and click the arrow to the right of **Build**. The last item should be **INBBuild**. Select it and your project should build using your script. Or you can select the new **Build::INBBuild** button on the right side of the toolbar. The output should appear in the **Monitor** window.

That may seem like a very complex way to run a simple script, but it gives you an idea of the power behind the **Tools Setup**.

User-defined options

Let's fine tune our build action so that we can specify options at build time. For example, your build script may accept a `/browse` parameter that tells it to produce browser output files. How

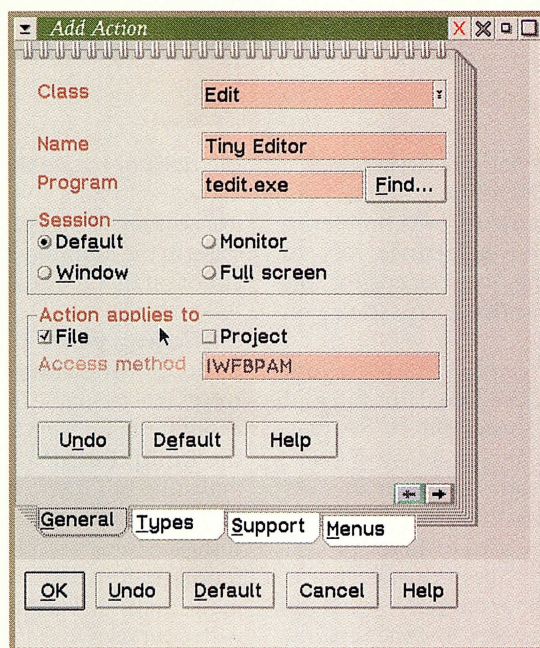


Figure 4: Adding your own editor to WorkFrame means filling out this dialog box.

do you implement this in WorkFrame? Just start with a copy of your original build and make a minor modification.

In the **Tools Setup** window, right-click on **Build::INBBuild** and select **Copy....** For **New Name**, enter

A Project is a File Object, Not a Folder Object

A WorkFrame project looks like a folder, it acts like a folder, so it must be... a file. WF projects behave very much like folders. They have a container view of files, you can drag-and-drop files and other objects, you can create shadows, they are real WPS objects with popup menus, and even the icon looks like a folder!

But WF projects are really files with important extended attributes (EAs). If you drag a file to a WF project and drop it there, it doesn't really exist inside the WF project. Rather, it gets moved into the project's working directory specified in the Settings notebook. All perceptions aside, it is actually a good thing that a WF project isn't a folder. If it were, you couldn't have a project that had files in separate subdirectories. And it wouldn't be as easy to copy projects to floppies, over networks, and to other machines.

INBBuild+Options and click the **Copy** button. Click on the + next to **Build** and right-click on the new **INBBuild+Options** object. Select **Project Options** from the menu. This is the dialog you saw previously, when we removed the project name from the parameters for the build. Now we want it to prompt us for parameters (such as `/browse`) for our build script. To do that, just check the **Prompt** box and click the **OK** button.

Go back to your project and on the menu select **Project→Build→INBBuild+Options**. A dialog will come up, asking you for input. Enter `/browse` (or some other parameter that your build script accepts) and click **OK**. Your build script's progress should now appear in the **Monitor** window.

Now that you've seen how to implement project-scope actions, let's add a file-scoped action.

Editing files

VisualAge C++ comes with a new Editor that you can use to edit your source. You may already have your own editor, but if that's the case, you'll notice that your source code files in the project window show the icon for your own editor. You'd think that double-clicking on them would bring up the source code in your editor, right? Well, no. And there's a very good reason.

Remember that right-clicking on a file in the project window shows the normal WPS file object menu on top, and some WF menu additions on the bottom. As we've seen before, the menu items that appear on the bottom are due to the file type associations set up in the **Tools Setup** window (Figure 3). The order in which those menu items show up is actually very significant and is dependent on the order of the **Action** items in the **Tools Setup** window (Figure 2).

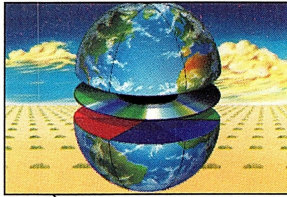
What WF does is order the menu items depending on their priority. For example, right-click on a source code file in your project. The first item will be **Edit**, followed by **View**, **Compile**, and **Package**. Click the arrow to the right of **Edit**, and you'll see **Editor**, **EPM**, and **System Editor**, in that order. What this means is that double-click-

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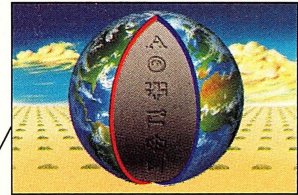
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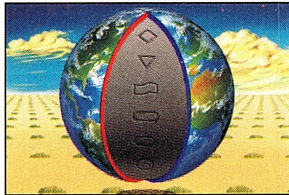
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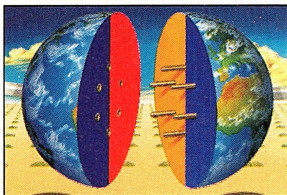
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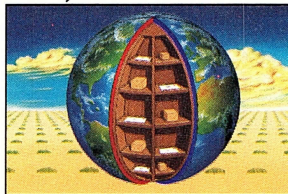
Network Connectivity



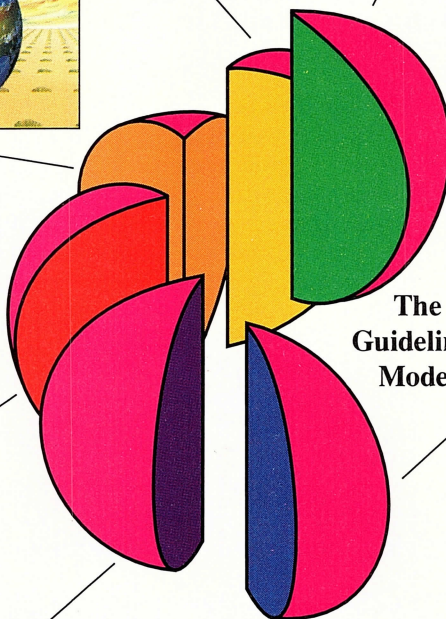
By mixing the connectivity components as required, applications can be built as thin clients, thick client/server with application partitioning, and fully distributed Object-Oriented. Supported hosts are: OS/2, AS/400, UNIX, MVS.

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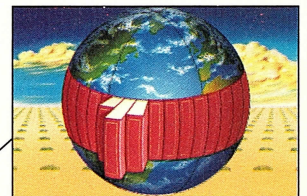
The Message layer is fully compatible with all current Object Request Broker (ORB) standards. JOT verbs provide a single interface to current technology and the OO of tomorrow. Guidelines provides CORBA IDL and IBM SOM support.



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ing on a file object will execute the first menu item added by WF. For a source code file that's Edit, and since the first menu item under the Edit menu is **Editor**, it starts the IBM Editor. This is somewhat different behavior from standard WPS, in which the first menu item (**Open**, rather than **Edit**) is the one that is executed.

So how do you add your own editor to the **Edit** pop-up menu and make it the default editor? Back to **Tools Setup**. (I told you it was a love/hate relationship!)

What we'll do now is very similar to what we did when we added the **INBBuild** action, except that the editor will be a file-scoped action rather than a project-scoped action. Click on the **Tools Setup** button on your **INBProject** window, and it opens by default into **Actions** view.

Right-click on **Edit** and select **Add...** In the **Add Action** dialog (Figure 4), make sure the **Class** is **Edit**. We'll use the OS/2 Warp Tiny Editor as our sample editor, so type "Tiny Editor" next to **Name**. For **Program**, enter "tedit.exe". (If you have a preferred source-code editor, substitute its name and file in place of the Tiny Editor.) For **Session**, select **Default**; for **Action Applies To**, select **File** and deselect **Project**.

Click on the **Types** tab. You must specify the file types that this action will act on. (To see the definition of each type, just click on each name and a line in the bottom of the notebook will list the associations. To add new types or modify the current ones, go back to the **Tools Setup** window and select the **Types View** button.) In this case, we want to select the **Editable Type** and click the top <<**Add** button to add it to the **Source Types** listbox.

Now click on the **Support** tab. Here you can add customized help for your action if it's available. And if your editor is WF-aware, you can specify an **Action Support DLL**. You may be tempted to just gloss over the **Priority** setting (as I initially did), but this is the key to making your editor the default editor.

As I mentioned before, the order of the menu items on the file's pop-up menu in your project is depen-

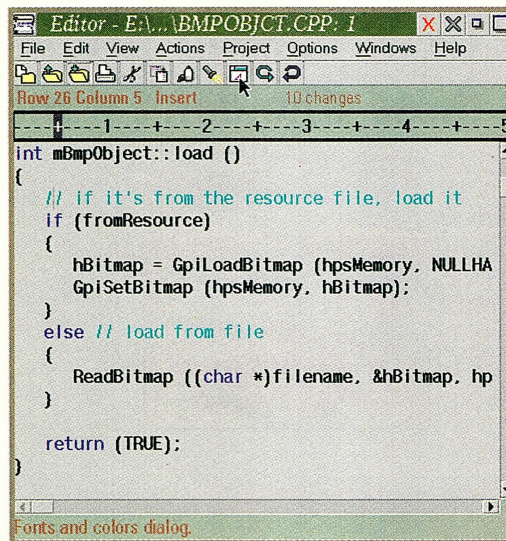


Figure 5: Editor has syntax highlighting for C/C++ code, a toolbar, and several status lines.

dent on their order in the **Tools Setup Actions** view. You might try drag-and-drop to reorder the **Edit** items in the **Tools Setup** window, but that doesn't work. That's because it's the **Priority** setting in this dialog that determines their order. By default, the IBM Editor has a **Priority** of 70, and new items such as these have a priority of 50. So just change the **Priority** to 71 or higher, and your editor will become the highest priority item. Then click **OK** to close the dialog.

(To confirm for yourself that the IBM Editor has a **Priority** of 70, go to the **Tools Setup** window and right-

click on **Editor**. Select **Where Defined** [since this project inherits from the standard VisualAge C++ project, you have to open that project to change or view the settings for Editor] and select **Yes** to open the parent project. In that **Tools Setup** window, right-click on **Editor** and select **Change...** Click on the **Support** tab, and you'll see that **Priority** is 70.)

Now go back to your **INBProject** and double-click a source file. The Tiny Editor should now be loaded. Close it and right-click on a source file in your project. Click the arrow to the right of **Edit**, and Tiny Editor should be listed first. Since it's the first item, it's the default item and gets loaded when you double-click the file.

The new IBM Editor

If you already have your own source code editor then chances are you're going to stick with it—editor choices being as religious as they are. However, if you've been using the System Editor or EPM and are looking for a better alternative, check out the new Editor included in VisualAge C++.

Editor is the default editor in WF. If you haven't changed the editor setup as described previously, just double-click on a C or C++ source file in your project, and Editor will come up. Otherwise, right-click on a file and choose **Edit→Editor**.

Editor has a number of modern visualage c++ (Figure 5). It supports syntax highlighting for C, C++, and other languages, and the colors are configurable via a dialog. It has a configurable toolbar, two status lines for cursor position, and a message line at the bottom for the current action. Another nice touch—because of its integration with WorkFrame—is the **Project** item on the main menu. From that menu you can access any of the project-scoped actions from your WF project such as build, debug, or browse. In addition, you can access the file-scoped actions for the file (such as compile), and bring the WF project to the foreground.

Another useful menu is **Help**. The **Help** menu has not only help for the Editor, but also for all the

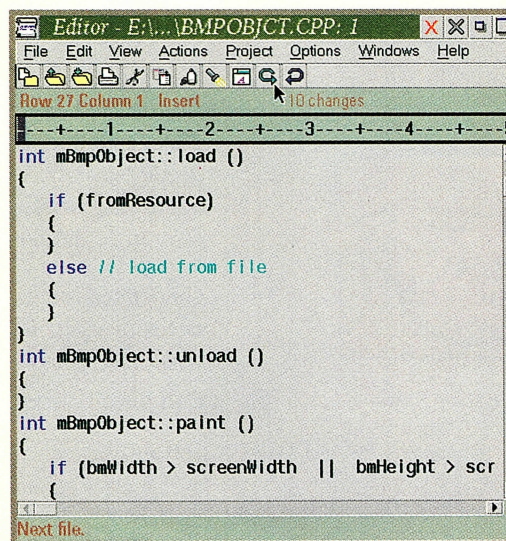


Figure 6: In Outline Logic view, Editor displays only the logic of your file, not every line.

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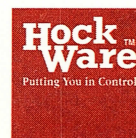
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other VisualAge C++ tools; OS/2, Presentation Manager, Multimedia, WPS, and SOM; the C/C++ language; Open Class library; and IPF and REXX. Editor also makes effective use of the <F1> key: press <F1> while your cursor is on a keyword such as **switch** or **GpiLoadBitmap** and the proper help will be brought up automatically. (The **Help** and **Project** menus are available on all the VisualAge C++ components: WF, Editor, Visual Builder, Debugger, Browser, and Performance Analyzer.)

Two other visualage c++ are worth noting. You can't split your editor window, as some editors do, but you can open multiple views of the same file. Each window keeps track of changes in the other one so they are always in sync, and you can use the toolbar to switch back and forth. You can also condense a C/C++ file down to just its programming logic (compare Figure 5 with Figure 6). Just select **View→Outline Logic** to go from Figure 5 to Figure 6. How does it do that? This brings us to the source of its power: the macro language.

The good news is, Editor is extremely configurable. You can change colors, the toolbar, menu items—even change the parser which controls syntax highlighting and the outline view. The bad news is, you have to learn its macro language to do any of these (with the exception of the color and fonts dialog).

The macro language is quite powerful, and a tutorial is beyond the scope of this article. The fastest way to find out more about it is to choose **Help→How Do I...** and look towards the end of the list where you'll find configuration, macro, and profiles help. For a list of macro commands, choose **Help→Editor Reference**.

What's next

This was a fast-paced tour of the tools you'll use most in going from your current tools to VisualAge C++. Next time we'll discuss the new visual tools that give the product its name. **OS/2**

Lou Miranda is a programming consultant and freelance writer based in St. Paul, Minn. You can reach him on the Internet at lmirand@ibm.net. You can also visit his Virtual Pundit web page for more OS/2 tips at <http://www.mirandacorp.com>.

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Using DOS Programs as OS/2 Functions

The amazing but true world of DosStartSession. By Bruce Eric Högman

You are developing an OS/2 application and you need to perform some function that is done by an existing program—and it's not an OS/2 program. No problem: You can use the **Dos StartSession** application programming interface (API) function to invoke that program as a subprogram or external function of your own.

Of course, you might instead choose to reinvent the wheel, or rather, write that same functionality from scratch in native OS/2 code. But there are some reasons why you should consider using that DOS program instead:

- That existing program runs successfully. It works.
- That program's interface is well-defined and isolated from your own application. It fits into your modular approach.
- You don't want to take the time to reproduce that existing program's functions in your own code—even if you have access to that source code. You need that functionality fast.

Sometimes using an existing program is an interim measure to support critical processes, while another permanent application solution is created and put in place. Whatever the reasons, you need to know how to invoke external programs as functions of your own program. Let's examine the several alternative API function calls in general and see how to use **Dos StartSession** as a general purpose solution.

Multiple API functions

You can use several API functions

to invoke other programs. **DosExecPgm** is a control program API that you can call to invoke a program of the same session type, Presentation Manager (PM), windowed text, or full screen. This is a low-level function. You can invoke a program as a child process and have your program wait as a parent process on the termination of the child, or have the child program run independently. The syntax for **DosExecPgm** is shown in Listing 1.

A session consists of one or more processes, with each, in turn, having one or more threads. A session has a virtual console or screen that is windowed, full screen, or Presentation

Listing 1: DosExecPgm syntax.

```
#define INCL_DOSPROCESS
#include <os2.h>

PCHAR      pObjname;
    /* points to the buffer holding the name of the object related to
       the failure of DosExecPgm */
LONG       cbObjname;
    /* Length in bytes of the buffer. */
ULONG      execFlag;
    /* Flag saying if program is child process and if debugging is
       enabled. */
PSZ        pArg;
    /* points to argument strings */
PSZ        pEnv;
    /* points to environment strings */
RESULTCODES pRes;
    /* points to RESULTCODES structure */
PSZ        pName;
    /* points to name of executable */
APIRET     ulrc;
    /* return code */

ulrc = DosExecPgm(pObjname,
                 cbObjname, execFlag, pArg,
                 pEnv, pRes, pName);
```


Manager window, together with buffers for keyboard and mouse input. Where **DosExecPgm** creates child *processes*, **DosStartSession** creates child *sessions*.

Using only the **DosExecPgm** API,

limits what programs your OS/2 application can launch. If you're developing a PM application, for example, that will call only other PM application programs to use them as functions of your

PM application, you should use **DosExecPgm** to establish a parent process and child process relationship to take advantage of some features that are available only to processes, which are in a parent and child relationship, such as **DosSetPriority** and **DosKillProcess**.

WinStartApp is a Presentation Manager API that uses Workplace Shell services in starting program sessions. You can invoke programs of all types using this API function. **WinStartApp** calls **DosStartSession** to create a new session after it processes arguments passed to it.

DosStartSession gives you all the features you need to start program sessions of any session type. Let's examine **DosStartSession**'s technical details more closely; its syntax is described in Listing 2, function arguments are in Listing 3, and its return codes are in Table 1.

The details

Instructions for tailoring the window session are passed to the operating system using the **STARTDATA** structure, as shown in Listing 4. (This and the other listings contain code with extra header files; that code uses the variable **typedef** acronyms defined in the header files. You should refer to the *.h* header files found in the toolkit or C++ **INCLUDE** directories for the current data structures definitions.) In this structure, the **Related** variable indicates whether the new session will be a child session or an independent one, and the **SessionType** indicates the type of window session: PM, windowed, or full screen (Table 2.).

Your understanding of **DosStartSession** may appear complicated as a result of all the information you provide in the **STARTDATA** structure. However, much of the information can be left **NULL** or zeros, and the operating system will provide safe default values.

The checklist for filling in the **STARTDATA** information and coding the **DosStartSession** call is fairly simple if you think of it as analogous to filling in the entry fields of a settings notebook for a **WPPProgram** object:

- Name the executable file to invoke. The drive and path may not be required if the program is in the **PATH** of the current environment.

Listing 2: DosStartSession syntax.

```
#define INCL_dossmgr
#include <os2.h>

/* type      variable */

PSTARTDATA psd;
    /* A pointer to the STARTDATA structure */
PULONG pidSession;
    /* points to session identifier returned */
PPID ppid;
    /* points to PID process ID of child process */
APIRET ulrc;
    /* Return code. */

ulrc = DosStartSession(psd,
    pidSession, ppid);
```

Listing 3: Arguments passed to DosStartSession.

```
/* variable names used in Listing 1 (with TYPE) */

psd (PSTARTDATA) - input
    A pointer to the STARTDATA structure

pidSession (PULONG) - output
    The session identifier is returned in the ULONG variable
    pointed to by this variable.

ppid (PPID) - output
    A pointer to the PID in which the process identifier
    associated with the child process created is returned.
```

Table 1: DosStartSession return codes.

ulrc (APIRET) - Return code.

DosStartSession returns one of the following values:

0	NO_ERROR
369	ERROR_SMG_INVALID_SESSION_ID
418	ERROR_SMG_INVALID_CALL
457	ERROR_SMG_START_IN_BACKGROUND
460	ERROR_SMG_PROCESS_NOT_PARENT
463	ERROR_SMG_RETRY_SUB_ALLOC

- Give the parameters to pass to that program.
- Say what type of session (such as PM, OS/2 window, or OS/2 full screen).
- Say whether the child session will be related or independent.

For Win-OS/2 programs, some changes are required. To launch a Win-OS/2 program, follow this procedure:

- **PgmName** should be `c:\os2\mdos\winos2\winos2.com` (you can substitute the system's boot drive if it's not C:).
- **PgmInputs** should be `/3 winappname winappopts` (/3 tells Win-OS/2 to run in enhanced mode. Other values options are `/r` for real mode or `/s` for standard, protected mode. If you don't specify a parameter, the default mode is set by the **Win-OS/2 Setup** object in the **OS/2 System Setup** folder. **winappname** is the executable filespec that is the target Win-OS/2 application program you want to invoke. **winappopts** are the parameters to pass to the target Win-OS/2 application program.)
- Set **SessionType** to **SSF_TYPE_VDM** for full-screen session or **SSF_TYPE_WINDOWEDVDM** for seamless Win-OS/2.
- Set **Related** to the value you want (Table 2).

The **PgmName** and **PgmInputs** strings' combined length may not exceed 1,024 characters.

You can start a command prompt window session by setting the **PgmName** address pointer to zero or by providing a null string and setting **PgmHandle** to zero. The OS/2 program specified in *config.sys*'s **SET OS2_SHELL** statement for OS/2 session types, or in **SHELL=** for DOS session types, is executed and uses **PgmInputs** string as its arguments.

Before calling **DosStartSession**, call **DosCreateQueue** to create a queue used as a termination queue to receive notification messages about the termination of the child session. You don't need to do this if you create an independent session (Listing 5).

Other details

If you don't know the type of program

Listing 4: STARTDATA structure.

```
typedef struct _STARTDATA {
    USHORT Length;
    /* Length of this structure in bytes, including Length
    variable */
    USHORT Related;
    /* When 1, created session is child (related) */
    USHORT FgBg;
    /* When 1, session is started in foreground */
    USHORT TraceOpt;
    /* When not zero, tracing options are in effect */
    PSZ PgmTitle;
    /* points to program title string */
    PSZ PgmName;
    /* points to filespec string of executable */
    PBYTE PgmInputs;
    /* points to arguments string or is zero */
    PBYTE TermQ;
    /* points to filespec string of system queue or is zero */
    PBYTE Environment;
    /* points to environment string(s) */
    USHORT InheritOpt;
    /* whether new session inherits environment and open file
    handles */
    USHORT SessionType;
    /* The type of session that should be created for this
    program. */
    PSZ IconFile;
    /* points to icon filespec string or is zero */
    ULONG PgmHandle;
    /* Either 0 or the program handle. */
    USHORT PgmControl;
    /* An indicator which specifies the initial state for a
    windowed application. */
    USHORT InitXPos;
    /* x-coordinate, in pels, for the initial session window. */
    USHORT InitYPos;
    /* y-coordinate, in pels, for the initial session window. */
    USHORT InitXSize;
    /* x extent, in pels, for the initial session window. */
    USHORT InitYSize;
    /* y extent, in pels, for the initial session window. */
    USHORT Reserved;
    /* Reserved; must be zero. */
    PSZ ObjectBuffer;
    /* Buffer in which the name of the object that contributed to
    the failure of DosExecPgm is returned. */
    ULONG ObjectBuffLen;
    /* The length, in bytes, of the buffer pointed to by
    ObjectBuffer. */
} STARTDATA;

typedef STARTDATA *PSTARTDATA;
```

you will invoke, you can let OS/2 decide the session type based on an

interpretation of the target load module. It's better, in general, to know the

Table 2: STARTDATA information.

Related (USHORT)

An indicator which specifies whether the session created is related to the calling session. The values of this field are:

- 0 SSF_RELATED_INDEPENDENT: New session is an independent session (not related).
- 1 SSF_RELATED_CHILD: New session is a child session (related).

SessionType (USHORT)

The type of session that should be created for this program. The possible values are:

- 0 SSF_TYPE_DEFAULT: Allow the Shell to set the session type based on the executable or use the PgmHandle data.
- 1 SSF_TYPE_FULLSCREEN: Start the program in a full screen session.
- 2 SSF_TYPE_WINDOWABLEVIO: Start the program in a windowed session for programs using the Base Video Subsystem.
- 3 SSF_TYPE_PM: Start the program in a windowed session for programs using the Presentation Manager services (including AVIO calls).
- 4 SSF_TYPE_VDM: Start the program in a full screen DOS session.
- 7 SSF_TYPE_WINDOWEDVDM: Start the program in a windowed DOS session.

Listing 5: DosCreateQueue.

```
#define INCL_DOSQUEUES
/* Queue values */
#include <os2.h>

HQUEUE hq;

/* Create a FIFO ordered queue */
DosCreateQueue(&hq,
    QUE_FIFO,
    "\\queues\\myque.que");
```

type of program that you want to use as a subprogram and to set up the call to **DosStartSession** appropriately.

Child or orphan? You can start a child session and wait on its completion or create it as an orphan—an independent and unrelated session. You can also indicate that you want to be notified upon its completion or discard the termination information.

A related session is called a child session, and the session starting the child

session is called the parent session. Sessions started as unrelated are independent sessions, not child sessions. An application can control its child sessions by using the session identifier returned by **DosStartSession** with the **DosSetSession**, **DosSelectSession**, and **DosStopSession** API calls. Only child sessions can be controlled. The **Related** field in the **STARTDATA** structure specifies whether the new session is related to the session calling **DosStartSession**. A session ID is returned only for child sessions.

When a parent session terminates, then all its child sessions are ended.

A child session may itself call **DosStartSession** to become a parent session. There is no session relationship between a parent session and its "grandchildren." However, a child session terminates when its parent does, and this holds true for each session in the family tree.

When creating child sessions, keep in mind that the child inherits the cur-

rent environment your application now has, unless you change the environment strings, current directory, and other system information. Under OS/2 Warp, you can also extend the **LIBPATH** using **SET BEGINLIBPATH=** or **SET ENDLIBPATH=** for environment variables to specify that path to prepend or to append to the **LIBPATH** specified in *config.sys*. This lets you dynamically add .dll file search paths to the environment for the current window session and its child sessions. Remember also that the current directory on each hard drive is part of the environment and affects relative path values (those that don't start with a \).

Foreground or background? New sessions may be started in the foreground (that is, have desktop window focus) only when the caller's session (or one of the caller's descendant session) is currently executing in the foreground. The foreground session for windowed applications is the session of the application that owns the window focus. The new session appears in the **Shell** switch list, and it's given window focus. An attempt to start a foreground session from a session not in the foreground will return a code 457 from **DosStartSession**, indicating that the new session was started in the background, and that the new session was started successfully. Your own program logic should anticipate this and accept both 0 and 457 as successful return codes.

A parent session can call **DosSetSession** to tell the Workplace Shell to set focus on a child session when the parent session is selected through the desktop window list. This is called establishing a bond. Only one child session at a time may be in a bond with its parent.

Maximized or minimized? Use **STARTDATA PgmControl** to specify whether you want the new session to start minimized or maximized, and whether a **WINDOWABLEVIO** session will have **AUTOCLOSE** in effect (the default). Sessions normally start neither minimized nor maximized.

Interprocess communication

Technical developers are eager to exploit operating system services to make their application run as fast as possible. They tend to use API func-

tions that support tightly coupled communication. These functions include shared memory, pipes, queues, and semaphores. In linking together separate application programs to perform complex functions, I advise developers to use the highest level and most dependable method of communicating data that fulfills the functional requirements. Most often, this results in the use of files, either permanent or temporary, to pass data among functional modules.

Using files to pass data is supported on all platforms and across all networks. True, it's often not as fast as more closely coupled methods of data communication, but it's often more reliable and less prone to timing problems, memory leaks, abnormal termination of processes, and so on. You can also develop your own multiple-program systems, using files initially, and then change to other methods once the bugs are fixed. Recording messages and data in files usually leaves excellent debugging footprints to help locate problem areas.

Creating a termination queue

To create a termination queue, call **DosCreateQueue** as shown in Listing 5. Use the **HQUEUE** handle, returned as the **STARTDATA TermQ** variable, in calls to **DosStartSession** and **DosReadQueue** (Listing 6).

Queue names follow rules for OS/2 file names (although no physical file is created). The queue name is prefixed by **\QUEUES**, followed by a file name and extension, such as **\QUEUES\myqueue.que**. The process that creates a queue is known as the server process of that queue. Other processes that access the queue are known as client processes.

To terminate a child session, call **DosReadQueue** with a zero value for the wait parameter to detect when a child session has ended. The **REQUESTDATA** variables pointed to will contain the PID of the process of the child session and the result code. The data element structure is two unsigned long integers:

```
ULONG PID of child
ULONG Result code
```

Call **DosFreeMem** to free the seg-

Listing 6: DosReadQueue.

```
#define INCL_DOSQUEUES
#include <os2.h>

HQUEUE      hq;
/* handle of target queue */
PREQUESTDATA pRequest;
/* pointer to REQUESTDATA structure */
PULONG      pcbData;
/* pointer to length of data being removed */
PPVOID      ppbuf;
/* pointer to queue element */
ULONG       element;
/* says whether to remove 1st element or an element that
was examined by DosPeekQueue */
BOOL32      wait;
/* whether to wait when no entries are in queue */
PBYTE       ppriority;
/* points to element's priority value */
HEV         hsem;
/* handle of event semaphore that is posted when wait=1 and
a new element has been added to the queue */
APIRET      ulrc;
/* Return Code. */

ulrc = DosReadQueue(hq, pRequest,
                    pcbData, ppbuf, element,
                    wait, ppriority, hsem);
```

Listing 7: Example code.

```
/* rxrnngo entry as function returning ULONG
Code included in RXRUN package */
ULONG rxrnngo (
    PULONG pgmrc, /* program return code */
    PSZ pgmname, /* target filespec */
    PSZ wintitle, /* switch list title string */
    PSZ parmstring, /* parameters for program */
    USHORT sesstype, /* code of session type */
    USHORT sessctl) /* code of MAX/MIN window */
{ APIRET badrc = ~0;
  DATETIME mydt;
  /* make a queue name using day & time of day */
  DosGetDateTime(&mydt);
  { UCHAR qname[64]="\\queues\\";
    sprintf(qname+8,"%01u",mydt.day);
    sprintf(qname+9,"%02u",mydt.hours);
    sprintf(qname+11,"%02u",mydt.minutes);
    sprintf(qname+13,"%02u.que",mydt.seconds);
    /* new queue for use as termination queue */
    { HQUEUE htermq;
      APIRET rcqueue = DosCreateQueue(&htermq,
        QUE_FIFO | QUE_CONVERT_ADDRESS, qname);
      if (rcqueue != NO_ERROR)
        { printf("rxrnngo DosCreateQueue error, RC=%lu\n",rcqueue);
```

cont'd on p. 50

Listing 7: Cont'd from p. 49.

```

    return rcqueue;
}
{ UCHAR objbuff[CCCHMAXPATH]="";
  /* define and initialize SData */
  STARTDATA SData = {
    sizeof(STARTDATA), /* Length */
    SSF_RELATED_CHILD, /* Related */
    0, 0, /* FgBg, TraceOpt */
    wintitle, /* PgmTitle */
    pgmname, /* PgmName */
    parmstring, /* PgmInputs */
    qname, /* TermQ */
    0, /* Environment */
    SSF_INHERTOPT_PARENT,
    sesstype,
    0, 0, /* IconFile, PgmHandle */
    sessctl, /* PgmControl */
    0,0,0,0,0, /* win coord */
    objbuff, /* buffer */
    sizeof(objbuff)); /* buffer len */
  /* call DosStartSession */
  { APIRET ulrc;
    PID pid = 0;
    ULONG ulSessID = 0;
    ulrc = DosStartSession(&SData, &ulSessID, &pid);
    /* note 457 is OK */
    if (ulrc != NO_ERROR && ulrc != 457)
    { printf("rxrnngo DosStartSession error,
RC=%lu\n",ulrc);
      return ulrc;
    }
    { STATUSDATA sdata = {
      sizeof(STATUSDATA),
      SET_SESSION_UNCHANGED,
      SET_SESSION_BOND };
      /* set bond between parent & child */
      ulrc = DosSetSession(ulSessID,&sdata);
      if (ulrc != NO_ERROR)
        printf("rxrnngo DosSetSession error, RC=%lu\n",ulrc);
      /* call DosReadQueue & wait */
      { REQUESTDATA Request = {0,0};
        ULONG buflen;
        BYTE bPriority;
        PVOID pbuf;
        ulrc = DosReadQueue(htermq,&Request,
          &buflen, (VOID **) &pbuf, 0,
          DCWW_WAIT, &bPriority, (HEV) NULL);
        if (ulrc != NO_ERROR)
        { printf("rxrnngo DosReadQueue error,
RC=%lu\n",ulrc);
          *pgmrc = 255;
        }
        else *pgmrc = Request.ulData;
        ulrc = DosFreeMem((VOID *)pbuf);
        if (ulrc != NO_ERROR)
          printf("rxrnngo DosFreeMem error, RC=%lu\n",ulrc);
        ulrc = DosCloseQueue(htermq);
      }
    }
  }
}

```

cont'd on p. 51

ment containing the data element, after processing the data element.

Your application may also use the queue created as a termination queue for other communication between sessions if you pass a unique request identifier via **DosWriteQueue**. Request identifier values, 0 through 99, are reserved by the operating system, so use values of 100 or greater.

The result code returned in the **TermQ** data element is that of the program named in the **PgmName** variable. When a secondary command processor (*cmd.exe*) is named and the target application is named in the parameters passed to the command processor, the result code is that of the target application program, provided that the command processor parameters included **/C** to close the command processor session immediately upon termination of the application program. If you use **/K** instead of **/C** when you invoke a command processor, then the result code will be that of the command processor itself.

The parent session becomes the foreground session when a child session terminates while having focus. When independent sessions terminate, the Workplace Shell selects the next foreground session.

When you use **DosStopSession** to terminate a child session, a process running in that session can ignore the request to terminate. **DosStopSession** still returns zero result code, indicating success. Only by waiting for notification, through using **DosReadQueue** to read the termination queue, can your parent session know when the child session has terminated.

Using **DosStopSession** breaks any bond that is established between the parent session and that child session by **DosSetSession**.

Final notes

When you use a debugger, use **Trace-Opt** value **SSF_TRACEOPT_TRACE-ALL (2)** to trace all descendant sessions. This requires that you also create child sessions and have a termination queue. The debugger must also call **DosReadQueue** to get notification when a child session is created and to free segments containing queue data elements that it removes using **DosFreeMem**.

One restriction: You can't call **DosStartSession** from a detached session,

Listing 7: Cont'd from p. 50.

```

if (ulrc != NO_ERROR)
    printf("rxrxngo DosCloseQueue error,
RC=%lu\n",ulrc);
} } } } }
return 0;
}

```

that is, a session started using DETACH on the command line or by a call to DosExecPgm using the EXEC_BACKGROUND flag.

You also can't use API functions that require a process relationship between the parent session and child session, which is a parent process and child process, because DosStartSession does not establish a parent process and child process relationship. The parent process of the child session is the shell process. The ppid (pointer to the PID) returned by DosStartSession may not be used in calls to system API functions, such as DosSetPriority or DosWait Child, which require a par-

ent process and child process relationship. Only DosExecPgm can establish a parent process and child process relationship.

Despite those minimal restrictions, you should find DosStartSession a worthwhile addition to your programmer's bag of tricks—after all, why reinvent a function when you can simply invoke an existing program? Listing 7 shows a C++ program that uses this technique, demonstrating the use of the APIs we've discussed.

References

The following references are distributed as .inf files with the IBM Visu-

alAge C++ and with the Developer's Toolkit for OS/2 Warp.

Control Program Reference: IBM OS/2 Control Program Guide and Reference provides technical information on APIs that call control program API services.

PM Reference: IBM OS/2 Presentation Manager Programming Guide and Reference provides technical information on Presentation Manager API services.

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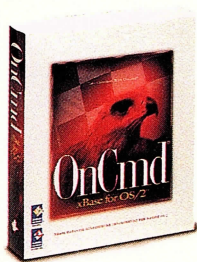
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Look What I Found

BY DICK GORAN

I've noticed the presence of *.inf* files that are installed as part of OS/2 Warp Connect, which don't show up in the **OS/2 System Information** folder (the folder with an object ID of `<WP_INFO>`). Some of these *.inf* files are included in the **OS/2 Peer/Books** folder, `<LS_BOOK>`, while others don't appear in any icon view at all. Since we have many new *.inf* files with OS/2 Warp Connect, I thought it would be a good idea to include a reference to each of these other files in the **WP_INFO** folder.

At the same time, I would like to create a new folder that contains a reference to the *.hlp* files associated with OS/2 Warp Connect. The complete REXX program, *9603ls01.cmd*, which accomplishes this task, is too large to include in this column. It can be downloaded in its entirety as *9603ls01.zip*. The Zip file includes the program source code as well as *wptool.dll*, a freeware API from Henk Kelder of the Netherlands, which is used to interrogate the contents of Workplace Shell objects from a REXX program. Code fragments included here contain the sequence numbers of the relative statements within the program. The sequence numbers, surrounded by square brackets, are also included, where appropriate, in the description of the program.

Figure 1 contains a copy of the **OS/2 System Information** folder after this program is run. The *.inf* files, which were added by this program, can be identified with the book logo containing a question mark.

First, we need to identify those *.inf* files that are already referenced in `<WP_INFO>`. The following is a list that contains the *.inf* files on my system prior to running this program:

```
<WP_MINDEX>
<WP_GLOSS>
<WP_RDME>
<WP_TUTOR>
<WP_CMDREF>
<WP_REXREF>
<WP_MULTIMBK>
<WP_PRINTBK>
<WP_PERFBK>
<WP_APPLBK>
<WP_WINOS2BK>
<WP_TRADEMBK>
<LDRHELP>
<PEERInst>
<PEERUser>
<PEERCmds>
#25F33
#2749E
#2D2AC
#227EB
#272A4
<CB_README>
```

Of course, those objects identified by a handle will differ by system. Listing 1 contains a list of all of the *.inf* files installed by OS/2 Warp Connect.

The objects contained in `<WP_INFO>` are not references to the actual *.inf* files. Rather, they are WProgram objects that launch the **VIEW** program and pass it the name of the *.inf* file to be viewed.

Similarly, the **VIEWHELP** program can be used to view *.hlp* files. Because REXX does not have a built-in way to query the contents of a folder (WFolder object), I used the *wptools.dll*. **WPTOOLS** contains two functions that meet our needs here. **WPToolsQueryFolderContent()** builds a stem, or compound, variable that contains the identity of each abstract object within the specified folder. **WPTools** provides the object ID for those objects created with

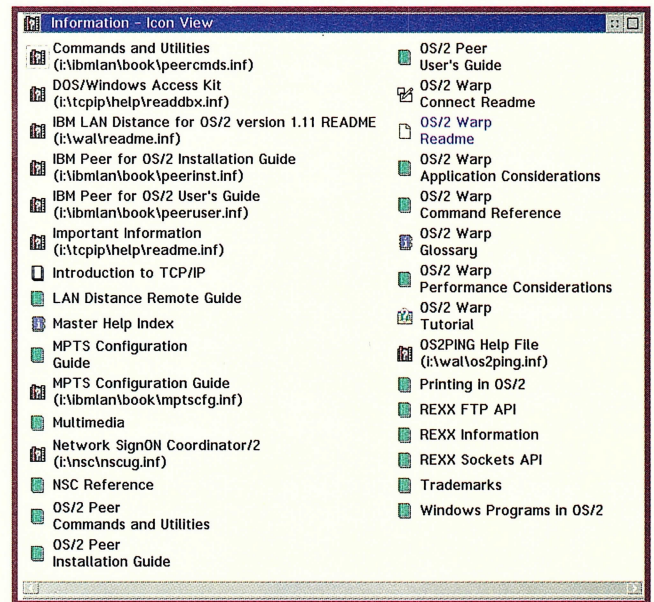


Figure 1: Resulting OS/2 System Information folder.

one; otherwise it provides the object's handle (a term more familiar to C++ programmers) for those objects that do not have an object ID.

Object IDs are defined as any string bounded by a less than character (<) and a greater than character (>). Object handles are returned as a hexadecimal string preceded with a # character [0109-0120]. The **WPToolsQueryObject()** function allows us to query each of the WProgram objects so that we can check the setup string used to create the object. Any of the objects that do not launch *view.exe* or *viewhelp.exe* will be ignored.

Once we have built a list of all of the WProgram objects in `<WP_INFO>`, we can then interrogate each of these to obtain a list of the *.inf* files that they reference. The WProgram objects that we are concerned with all contain a setup string value of **EXENAME=**, indicating

The REXX Column

that the **VIEW** program is to be launched for **.inf** files and **VIEWHELP** is to be launched for **.hlp** files. Unfortunately, no consistency was used in defining the program to be used. Various combinations of **view** and **view.exe** appear both with and without a path. The same is true for **viewhelp.exe**. The **SysSearchPath()** function will return the full file system name for these programs that we can use as a reference [0104-0107]. Once the program name is determined, the **.inf** or **.hlp** file name can be extracted from the **PARAMETERS=file_name** setup string [0165-0190].

Each **.inf** and **.hlp** file will be added to an associative array, which was initialized to nulls [0198-0208]. An *associative array* is a compound variable with indices (tails) that are not sequential or in any given order. Associative arrays are unique to REXX ("The REXX Column," December 1994, p. 67). The index of each array's element is the full file system name (drive, path, and file name) of the **.inf** or **.hlp** file. Any non-null value can be assigned to each of these array elements, because the array was initialized to a nulls. Special attention must be paid to using non-numeric tails. By definition, REXX treats all variable and stem names as if they were written in uppercase. Tails, on the other hand, are processed in the case they were written. Therefore, when a variable containing non-numeric data is used as a tail in a compound variable, it must be written in uppercase [0202, 0385].

Because our purpose is to include the **.inf** and **.hlp** files included with the OS/2 Warp Connect install, the next task is to build a stem variable containing all of these files contained in the Connect-related directories. These directories are **grpware**, **ibmcom**, **ibmlan**, **lanlk**, **mpn**, **muglib**, **nsc**, **tcpip**, and **wal**. The **SysFileTree()** function in **REXX UTIL** is used to build a temporary array of the files in each of these directories. The contents of the temporary array is cumulatively copied to a combined array. This task must be done by element, unless Object REXX, or an external API, is used, which permits copying arrays in their entirety [0218-0223].

Each of the **.inf** and **.hlp** files in the compound array is checked against the associative array built from the contents

of the **<WP_INFO>** folder. Entries that have a non-null associate array value (indicating that they are already referenced) are ignored. New **.inf** file objects are added to the **<WP_INFO>** folder, and new **.hlp** objects are added to the new folder created for this exclusive purpose [0228-0240]. Depending upon your installation, you should find that four to six new entries will be added to **<WP_INFO>**, and over 60 **.hlp** file objects will be added to the **Connect Related HLP Files** folder.

Many of the **.hlp** files will produce some insight into the workings of the Connect-related programs. Generally, you would not see these **.hlp** files without previously having launched the respective program. This is a Catch-22 situation, if you don't know that the program exists. For example, the **Connection Manager** program (**\ibmlan\netprog\conman.exe**) is not referenced in any of the **Connect** folders. (I didn't even know about it until I built the new folder.) I will leave it to you, the reader, to see what **Connection Manager** is all about.

Some of the **.hlp** files have titles and others don't. When a title could be extracted from the **.hlp** file [0278-0309], it was used as the first of a two-line title for the **WPPROGRAM** object, with the file system name used as the second line. Where no **.hlp** file title could be found, the **WPPROGRAM** object title is just the file system name.

Many bits of wisdom can be gleaned from the **.hlp** files. Take a look at **\tcpip\help\tcpguide.hlp**. It contains the only source of information I have found about the **netrc** file capability. **NETRC** can also be used as an environment variable that points to a file of your choice to be used by the **NETRC** facility for controlling FTP and **REXEC** clients. You can read this information by searching in the **tcpguide.hlp** file for **netrc**. 

Listing 1: .inf on OS/2 Warp Connect.

```
?:\ibmlan\book\mptscfg.inf
?:\ibmlan\book\peercmds.inf
?:\ibmlan\book\peerinst.inf
?:\ibmlan\book\peeruser.inf
?:\mmos2\mcirexx.inf
?:\nsc\nscug.inf
?:\os2\book\applbk.inf
?:\os2\book\cmdref.inf
?:\os2\book\multimbk.inf
?:\os2\book\perfbk.inf
?:\os2\book\printbk.inf
?:\os2\book\rexx.inf
?:\os2\book\tradembk.inf
?:\os2\book\winos2bk.inf
?:\os2\drivers\sb16d2\oemsetup.inf
?:\os2\mdos\winos2\system\apps.inf
?:\os2\mdos\winos2\system\control.inf
?:\os2\mdos\winos2\system\drvmap.inf
?:\os2\mdos\winos2\system\oemmach.inf
?:\os2\mdos\winos2\system\setup.inf
?:\os2\pmcontrl.inf
?:\tcpip\doc\rxftp.inf
?:\tcpip\doc\rxsocket.inf
?:\tcpip\help\readdbx.inf
?:\tcpip\help\readme.inf
?:\wal\ldrem.inf
?:\wal\os2ping.inf
?:\wal\readme.inf
```

Dick Goran is the author of the REXX Reference Summary Handbook, an OS/2 reference. He has been in the computer industry since 1961 and was in the IBM mainframe systems software development business until 1987. He teaches OS/2 REXX to corporate clients and lectures on OS/2. His free REXX utility programs can be downloaded from OS2DF1, Lib 6 on CompuServe or FTPed from <ftp://ftp.cfsrexx.com/pub>. He can be reached at CompuServe 71154,2002, or Internet dgoran@cfsrexx.com.

Resources:

9603LS01.Zip

<ftp.cfsrexx.com/pub/9603ls01.zip>
CompuServe, OS2AVEN forum (OS/2 Magazine), Library 2

WPTOOL18.Zip-free for download

<ftp.cfsrexx.com/pub/wptool18.zip>
CompuServe, OS2AVEN forum (OS/2 Magazine), Library 2



Encapsulation and the EPIC Nature of Dogs

BY ROGER SESSIONS

If we know that Lassie is a dog, then we know something about Lassie.

If we know what dogs in general do and don't do, then we know what Lassie will and won't do. If we know that dogs bark when we ring the door bell, then we know that Lassie will bark when we ring the door bell. If we know dogs can't fly, then we know Lassie can't fly.

But knowing that Lassie is a dog doesn't tell us everything about Lassie. It tells us what she does and under what circumstances, but not how. Unless we are an expert on the implementation of dogs, we have no idea how Lassie actually goes about the business of barking. We don't know how the millions of neurons in her brain fire in the correct sequence, what muscles are involved, or how she makes her vocal chords vibrate. All we know is that given an appropriate stimulus, Lassie goes "Woof Woof."

In fact, we can't even prove that Lassie is really doing the barking. For all we know, Lassie is using a tape recorder. Or Lassie might be nothing more than an elaborate puppet and her bark coming from a good ventriloquist. Or maybe Lassie calls in a barking specialist whenever she hears the doorbell, and Lassie acts as nothing more than a noise broker.

It is said that the truth shall set us free. In this case at least, it is our ignorance that sets us free. Or more precisely, sets Lassie free. The less we know about Lassie, the more freedom Lassie has in her implementation. As long as she can figure out some way to make a whole bunch of noise when the doorbell rings, we will be happy, feed her, and not ask silly questions.

In object-oriented programming, we call this general principal *encapsulation*. Encapsulation says that we ask objects

only what they do, not how they do it. An object, say Lassie, is encapsulated if its interactions with its client are determined only by its interface and not by its implementation.

Comparison of three languages

Lets look at the concept of interface from the perspective of three different programming languages, all supported on OS/2. These languages are C++, SOM's IDL (Interface Definition Language), and good old reliable C.

We describe objects by their interfaces. Loosely speaking, we can think of an interface as describing the behaviors or the methods that a class supports.

Our dog class will support two methods, a **setBark** method, which is used to tell the dog what its bark is, and a **bark** method, which is used to tell the dog that the time has come to bark. Since Lassie is a dog, we know she will support these methods.

In C++, using for example IBM's VisualAge C++ on OS/2, we could describe our dog interface as:

```
class dog {
public:
    void setBark(char *newBark);
    void bark();
private:
    char *myBark;
};
```

C++ breaks a class definition into two sections, a public and a private section. The public one is the class's interface. The private section is intended to be of interest only to the programmer implementing the interface and can change without warning.

IDL (Interface Definition Language)

is defined by the Object Management Group (OMG). It's unique in that the choice of the language used in the implementation of the class is not constrained by the language used to define the interface. In contrast to IDL, if we define our interface in C++, we can use only C++ for implementing our class. If we define our interface in IDL, we can use C++, C, COBOL, or any other language that supports IDL.

IBM considers IDL strategic and is supporting it, or planning on supporting it, with all of its languages on all of its platforms. The IBM implementation of IDL is called SOM, for the System Object Model. SOM has been available on OS/2 for a number of years now.

In SOM IDL we can describe our dog interface like this:

```
#include <somobj.idl>
interface dog : SOMObject {
    void setBark(
        in char *newBark);
    void bark();
    implementation {
        callstyle = "oidl";
    };
};
```

This dog interface contains a great deal of information, more than one might expect by looking at this deceptively simple definition. However, we are only interested in encapsulation and from this perspective the IDL dog interface defines the same two methods as the C++ definition, **setBark** and **bark**.

This IDL definition, similar to its C++ counterpart, tells us that the **setBark** method takes a single string parameter and that the **bark** method returns a string. Like C++, it doesn't tell

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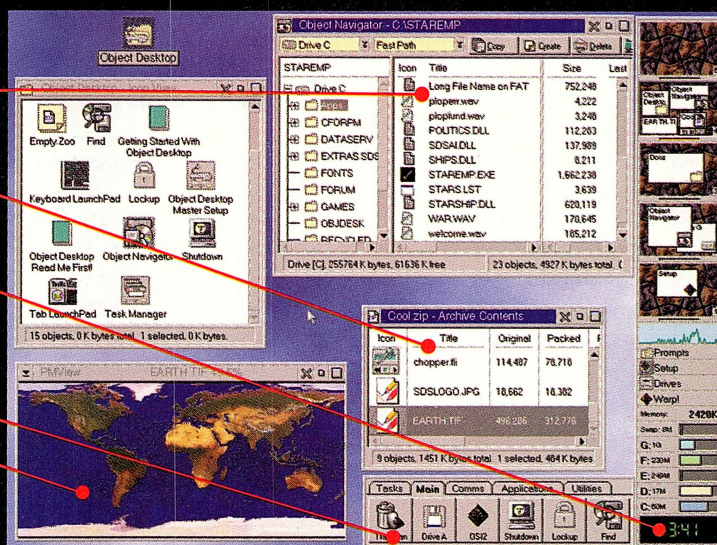
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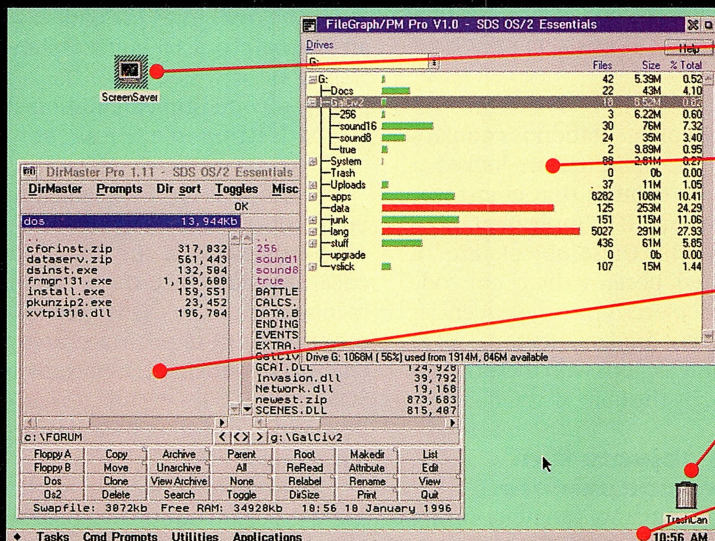
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us how the dog stores that string. Extending the idea of encapsulation beyond C++, the IDL definition doesn't tell us in what language the code implementing **setBark** and **bark** is written. Also, IDL does not support the concept of public and private sections. If it's not part of the public interface, it shouldn't be part of the IDL. At least, it shouldn't be part of the IDL you allow clients to see.

A client that understands the contract implied by the dog definition can write code against that contract. One example of C++ client code using this dog looks like the following:

```
#include "dog.hpp"
int main()
{
    dog *Lassie;
    Lassie = new dog;
    Lassie->setBark(
        "Woof Woof");
    Lassie->bark();
}
```

On OS/2, this C++ source code is compatible with a dog defined in IDL and implemented in either C++ or C. It is also compatible with a dog both defined and implemented in C++.

A C client can also use this dog if it is defined in IDL. This client looks like:

```
#include <dog.h>

int main()
{
    dog Lassie;
    Lassie = dogNew();
    _setBark(Lassie,
        "Woof Woof");
    _bark(Lassie);
    return(0);
}
```

This C code is compatible with a dog defined in IDL and implemented in either C or C++. It is not compatible with a dog defined and implemented in C++, because C++ does not support the use of its classes by other languages.

We can even define and implement our encapsulated dog completely in C. An equivalent C definition for a dog is:

```
struct dogType {
    char *myBark;
};
```

```
typedef struct dogType *dog;

void _setBark(dog thisDog,
    char *newBark);
void _bark(dog thisDog);
dog dogNew(void);
```

and a C implementation of this dog is:

```
#include "dog.h"
#include <string.h>
#include <stdio.h>
#include <stdlib.h>

void _setBark(
    dog thisDog,
    char *newBark)
{
    thisDog->myBark =
        (char *) malloc(strlen
            (newBark)+1);
    strcpy(thisDog->myBark,
        newBark);
}

void _bark(dog thisDog)
{
    printf("%s\n",
        thisDog->myBark);
}

dog dogNew()
{
    return (dog)
        malloc(sizeof(dog));
}
```

This C implementation is compatible with the C client that we looked at earlier, even though that client was written to use an IDL implementation.

We say that these objects are all encapsulated, because the client code using these objects has no dependencies on the objects' implementations. All of the client interactions with these objects are defined by the objects' interface.

Writing objects that are nonencapsulated

Just as we saw that we can write encapsulated objects in nonobject-oriented languages (such as C), we can also write poorly encapsulated objects in state-of-the-art object-oriented languages.

For example, we know our dog has to store its bark string. A nonencapsulated implementation could store the bark string in global memory allocated by the client. In order to use this dog, the client must allocate a buffer, declare a global variable with a partic-

ular name, and set that variable to the previously allocated buffer.

Because this implementation of dog requires the client to know quite a bit about how the dog manages its string storage (information that is not part of the interface), we say this dog implementation is not encapsulated. And we can write this sorry code in SOM, C++, or C.

EPIC objects

Encapsulated objects have what I call EPIC characteristics. EPIC stands for Exchangeable, Protectable, Isolatable, and Confidential. These characteristics are so important that even products like Microsoft's OLE, which rejects the other key ideas of object-oriented programming, accepts the importance of encapsulation.

Lets consider each of these in turn.

Exchangeable

The E in EPIC stands for Exchangeable. Different implementations of well-encapsulated objects can be exchanged for each other without impacting their clients.

Lets consider two possible SOM implementations of our IDL dogs, both in C. The first stores the bark string in an internal character buffer as shown in Listing 1.

The second implementation stores the bark string in a file as shown in Listing 2.

Which is the right implementation? Both. Either works fine for our immediate needs. Because the dog is a well-encapsulated object, these two implementations can be exchanged for each other without requiring source code changes to our client. In fact, by using SOM on OS/2, these changes can even be made at run time by a simple DLL replacement.

Our nonencapsulated dog, the one using the client-allocated global buffer, is not exchangeable with these two encapsulated versions. Without the client changing its source to allocate that buffer, that dog will not bark.

Exchangeability gives the object implementor considerable flexibility. For example, it's a common practice to prototype interfaces with a simple implementation and then add more robust, better performing, or less limited code later in the development cycle.

Exchangeability also gives flexibility to the client, who can write code with one implementation of dog and then find, write, or purchase a better implementation at any time.

Protectable

The P in EPIC stands for Protectable. Encapsulated objects are protected from odd behavior on the part of their clients.

With encapsulated objects, clients interact with objects only through approved methods. These methods can be guarded with code that checks and rejects invocations that would otherwise cause catastrophic failure, such as calling the dog's `setBark` with a string that contains unprintable characters.

Code using protected objects is very robust. It is almost impossible to break a well-protected object.

Nonencapsulated objects do not support this level of protection. For example, it would be very easy for the client of the nonencapsulated dog to place corrupted values in the global memory used by the dog object. The next time that dog tries to bark, watch out!

Isolatable

The I in EPIC stands for Isolatable. Encapsulated objects can be written, tested, and debugged in full isolation

of the code that will be eventually using them.

This ability to isolate the object implementation from other development activity is a great advantage. It offers a natural mechanism for dividing large projects into a series of small well-defined subprojects, all of which can be worked on in parallel.

The goal of isolatability was shared by another historic programming methodology, structured programming. Encapsulation, though, goes much further than structured programming ever did. Structured programming only offered techniques for partitioning a program's logic. It offered nothing for dealing with the much more complex issue of a program's data. Encapsulation shows us how to partition both logic and data.

Confidential

The C in EPIC stands for Confidential. Encapsulated objects can keep their secrets.

This issue can be significant for classes that will be marketed. When we sell classes, we want to ship nothing

but binary object files in the form of libraries and DLLs and interfaces definitions in the form of text files. We don't want to sell our source code. We consider our source code proprietary.

The names of private methods and the design of our data structures can also give important clues to the nature of our algorithms. By showing our clients nothing but the public interface, we can keep our algorithms confidential.

Of the three languages we have discussed, only SOM's IDL has first-rate support for confidentiality. C++ and C both require that private algorithm-revealing information be openly displayed along with the interface.

C++ actually has an even more serious problem in this area. C++ has very limited support for shipping class code in anything other than source code. This limited support is because of, among other reasons, a general lack of agreement among C++ compiler ven-

Listing 1: Dog with memory buffer.

```
#include "dog.ih"
#include <stdlib.h>
#include <stdio.h>

SOM_Scope void SOMLINK setBark(
dog    somSelf,
char*   newBark)
{
    dogData *somThis = dogGetData(somSelf);

    _myBark = (string)
        SOMMalloc(strlen(newBark)+1);
    strcpy(_myBark, newBark);
}

SOM_Scope void SOMLINK bark(
dog somSelf)
{
    dogData *somThis = dogGetData(somSelf);
    printf("%s\n", _myBark);
}
```

Listing 2: Dog with file.

```
#include "dog.ih"
#include <stdlib.h>
#include <stdio.h>

#define dogFile "dog.dat"

SOM_Scope void SOMLINK setBark(
dog    somSelf,
char*   newBark)
{
    FILE *f;
    f = fopen(dogFile, "w");
    fprintf(f, "%s", newBark);
    fclose(f);
}

SOM_Scope void SOMLINK bark(
dog somSelf)
{
    FILE *f;
    int n = '\0';
    char buff[100];

    f = fopen(dogFile, "r");
    for (n=0; n!='\n'; n++) {
        fscanf(f, "%c", &buff[n]);
    }
    buff[n-1] = '\0';
    fclose(f);

    printf("%s\n", buff);
}
```


dors as to the nature of the run-time object model. In this regard, C is actually more advanced than C++.

Conclusion

We have looked at three different OS/2 technologies, C++, SOM, and C. We have seen that all of these technologies support encapsulation. Encapsulation is important because it allows the development of objects that are Exchangeable, Protectable, Isolatable, and Confidential. These are the EPIC characteristics of encapsulated objects.

The best, but not the only, support for encapsulation comes from object-oriented technology, and this is one of the factors driving its rapid adoption. All of these OS/2 technologies, both object-oriented and nonobject-oriented have good support for Exchangeability, Protectability, and Isolatability. Confidentiality is mainly an issue for companies selling class libraries. In this area, SOM offers the best support, followed by C, followed by C++.

Remember, that we can get poorly written nonencapsulated code using

both C++ and SOM. We can also get well-written highly encapsulated code using C. This is as much a programmer issue as it is a technology issue.

To keep all these options in perspective, just keep the following in mind. We want Lassie to be a good dog. The better encapsulated we make her, the more EPIC her character will be.

News from the object front

At the end of 1995, IBM made an important announcement. They have decided to license the Java technology for use in OS/2. Java is a new language which allows compiled objects to run on any hardware or software platform.

This technology could work well with SOM. SOM allows methods to be invoked on objects living on other machines, but has no way of downloading the code necessary to implement those methods. Java offers the ability to download an object's implementation to any machine, but no way of allowing methods to be remotely invoked on that downloaded object.

These two technologies offer a perfect complement to each other. However, the current information from IBM is sketchy. No information is available from the IBM announcements or on the IBM World Wide Web pages, which claim to give the most recent Java information, to indicate that IBM understands the important relationship between Java and SOM. My friends within IBM assure me that this relationship is being investigated. I will be watching this topic very carefully and reporting on developments as they unfold. **OS/2**

Roger Sessions is president of ObjectWatch Inc., a company specializing in training and consulting in the use of SOM, DSOM, and related object-oriented technologies. He has spoken at over 30 conferences and has written extensively. His books include Object Persistence: Beyond Object-Oriented Databases, Class Construction in C and C++; Object-Oriented Fundamentals, and Reusable Data Structures for C. Roger also publishes an Internet newsletter called ObjectWatch on SOM and can be contacted via e-mail at roger@fc.net.

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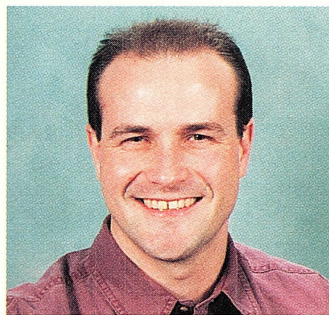
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A Pointer of Contention

BY MARK BENGE AND MATT SMITH



Building on what was learned last time with icons, we will now take you on a *Magical Mystery Tour* of pointers. Pointers are very, very similar to icons. In fact, icons can be pointers at times (for example, when you shovel an icon around on the desktop).

The only difference between a pointer and an icon resides in the **BITMAP-FILEHEADER2** where the **usType** field is either **BFT_POINTER** or **BFT_COLORPOINTER** and the **xHotspot** and **yHotspot** fields contain positions defined by the user.

What's the pointer?

Remembering back to the last issue, we dissected an icon that was actually composed of two different bitmaps: the **AND/XOR** mask and the color image. Pointers are the same, although you may see some that are only black-and-white. The reason for this? Hardware!

Today, some of the more advanced video cards have built-in support for mouse pointers. Generally, the largest pointer size supported is 64×64. The number of colors is two.

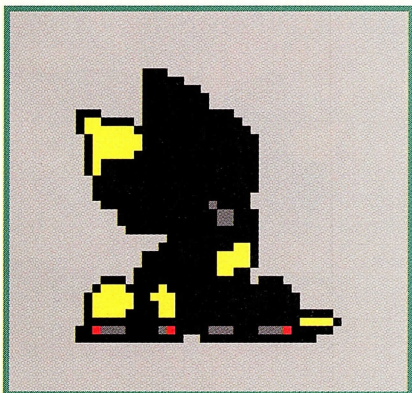


Figure 1: Cat bitmap.

So how do you know whether or not a video card has mouse cursor support? Easy, open a command prompt window and make sure the mouse pointer is within the window and oriented towards the window's left edge; perhaps a few characters inward. Then, do a directory listing (try to use a directory with several files) and watch the mouse pointer. If it flickers during the scrolling of the window, most likely the video card doesn't have built-in support. If it doesn't flicker and appears to be rock solid in appearance, it's a good sign that mouse pointer support is built in to the hardware.

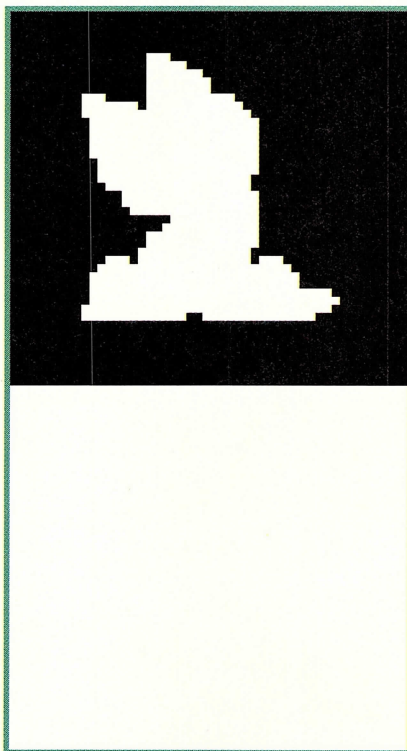


Figure 2: AND/XOR mask.

Build your own pointer

So how can we build a nonstandard pointer? Easily, since we know what is needed to draw a pointer.

First, we need a bitmap image. Next, we need to build an **AND/XOR** mask from that image. Then, we need to create the color image that is used, and, finally, with these new bitmap images, we can draw our pointer.

Consider the image in Figure 1, our trusting cat. This image will be the starting point for our pointer.

The first step is to build the **AND/XOR** mask. To do this, we need to determine which color within the bitmap image will be our background color reference. Confused a bit?

Remember, in the **Icon Editor** when we create a pointer, we have two additional color selections: **Screen** and **Inverse**. These two colors are used to construct the **AND/XOR** mask. The **Screen** color corresponds to the **XOR** portion of the mask, and the **Inverse** color corresponds to the **AND** portion of it.

In our case, we just want to construct the **XOR** portion of the mask. By selecting a display color in our bitmap to act as the **Screen** color, we can easily construct the mask.

For this step, we will select the gray color that surrounds the kitty. The final mask should look like the one shown in Figure 2.

A red border has been included around the mask to allow you to see the extent of the mask. The **AND** portion of the mask is the lower white area and the **XOR** portion is the upper area.

The color portion of the image appears the same as the one in Figure 3.

These two new bitmaps are then drawn using the **ROP** codes: **ROP**

_SRCAND, ROP_SRCPAINT, and ROP_SRCINVERT, similar to the icon-drawing method.

Warning: construction zone!

So, how do we build these two images from a single bitmap? First, we choose the color for our background mask; in this case it's gray.

Next, using this information, we build an intermediate bitmap image that will be used to create our final two-color mask. In the November/December issue of *OS/2 Developer* "What's in a Bitmap?" (p. 12), we showed how to surf on the color table of the bitmap. Guess what? That is exactly what we do here to create the intermediate image.

It's assumed that we have loaded the original bitmap image from a file. This means that we can manipulate the color table and have access to the image data.

We first determine the index of the background color. Knowing this index, we set it to the RGB value of black. Finally, we create the color image from this information.

Next, we need to create the AND/XOR intermediate image. Here we set all the entries within the color table to RGB white. Then we set the index of the background color to RGB black. These settings allow us to create somewhat of a two-color version of the image. This information, along with the image data, is then used to create the intermediate bitmap.

To create the final two-color bitmap, we use this intermediate bitmap. This time we create the two-color bitmap from scratch. In other words, we initialize the bitmap header and create the bitmap in memory. We draw into this

new bitmap the intermediate bitmap.

Finally, we have our color image and our AND/XOR mask.

With this lesson firmly under our belts, let's select a different background color for the original bitmap in Figure 1. How about the white of the image?

Okay, the AND/XOR mask would look like that in Figure 4.

It looks a little different than the mask in Figure 2, but it's doing the same task. The color image that we would get is shown in Figure 5.

We use the same mechanism described earlier to create the AND/XOR mask and the color image. In essence, it's a matter of finding the index within the RGB table of the original bitmap and manipulating it to create our final results.

On the count of three, DRAW!

The next problem is how to draw the pointer first in one location and then in another? Smoke and mirrors per chance?

Well, almost. Two methods can be used. The first one, which is the easiest, is to force the repaint of the area where the pointer was last located. All this

operation requires is basically the **WinInvalidateRect(hWnd, &rcIPointer, TRUE)** call. Programmatically speaking, this process is the easiest and fastest. It is also the ugliest.

Why do we say ugliest? Well, it's due to the fact that you get a decidedly noticeable flicker effect, especially on slower machines. This flicker is due to the fact that the redrawing of the area below the pointer is required. At first glance it might seem trivial. Isn't the pointer relatively small? Didn't we just invalidate the area where the pointer was? So what's the problem? We are just redrawing the area where the pointer was, aren't we?

Maybe yes and maybe no. Consider the following image in Figure 6.

The red rectangle depicts a possible location for the pointer, and there are many different windows beneath it. In fact, we have 11 different windows within the rectangle area. As a result, the paint routines of 11 different windows have to be called. And, depending on the complexity of these painting routines (how much stuff they have to shovel to the screen), it might take a significant amount of time to update them all. Even if just one pixel is invalid, the remaining pixels of the window might have to be drawn. Surely something to consider.

Remember, we said the method was programmatically easier. Programmatically easier for us, but not for the actual results.

As for the second method, this one is much more programmatically challenging because we have to do all the work. It still causes flicker of the pointer but is much faster than the other technique in refreshing the area where the mouse

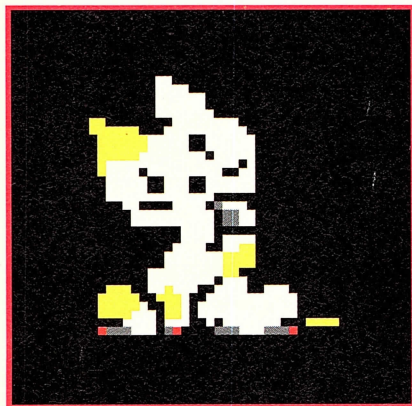


Figure 3: Color image.

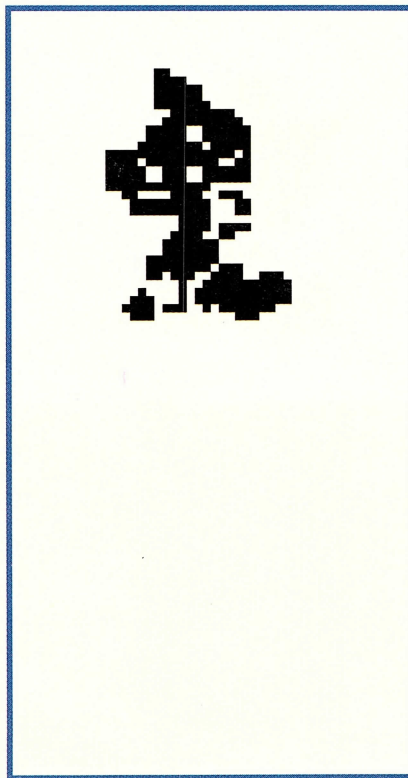


Figure 4: AND/XOR mask.

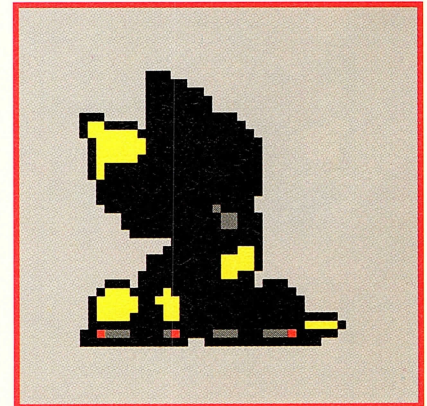


Figure 5: Color image.

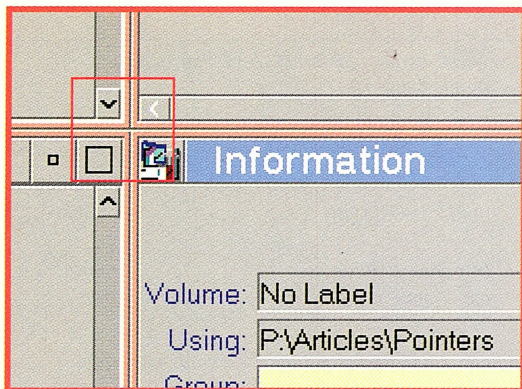


Figure 6: Possible drawing rectangle.

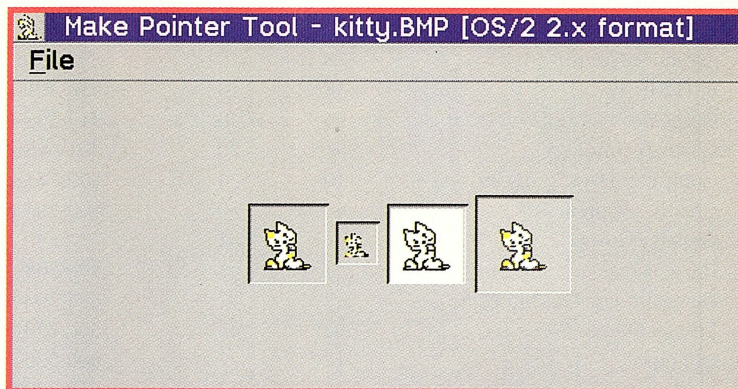


Figure 7: Make pointer tool window.

pointer resided. In fact, it's a similar technique to the one used by the actual mouse pointer drawing routines.

It entails capturing the image beneath the mouse pointer so that it's restored when the mouse pointer moves to a new location.

We accomplish this action by creating a bitmap of the area where the mouse pointer is to reside and then save it. When we determine that the mouse pointer has moved, we then **BitBlt** the captured bitmap image back to the screen, thereby repairing the window.

Our technique is very simple. The techniques used by the actual mouse pointer drawing routines are much more sophisticated. They take into consideration the redrawing within a window, or set of windows, where the mouse pointer resides. Basically, the pointer can appear to co-exist within the window or windows such that it doesn't require any intervention by you.

As for our pointer, we don't have the luxury of knowing when it's about to be checked into a snowbank. Therefore, you have to consider just using this pointer to just do special tasks where you are, in effect, in control of the entire window or desktop.

This technique is the one used by the drag-and-drop routines. When you are dragging, you see the special mouse pointer image, which is larger in some cases than the normal mouse pointer. The drag-and-drop routines effectively prevent any refreshing of the windows within the desktop area, thus allowing the routines to move the drag image around.

In our example, we allow mobility within the dialogue window, knowing full well that if something causes an

invalidation of the dialogue, the mouse pointer image might appear to have disappeared. Only if we moved the mouse pointer would it seem to reappear. Also, if the area where the mouse pointer was located is different, the saved section that restores the area would be very wrong.

One way of doing it is to use **WinLockWindowUpdate(HWND_DESKTOP, HWND_DESKTOP)**, which would cause the desktop and all descendants to be prevented from being repainted.

The freebie example

In our sample code, we have once again adapted our driver to load a bitmap, which can be selected as the test.

When you click the right mouse button when the pointer is over one of the displayed images (Figure 7), it will use the image beneath as the test image. The pixel, immediately beneath the hot spot of the mouse pointer, is the color on which the background is based. This color forms the basis of the **AND/XOR** mask. In effect, we're killing two birds with one swipe of the paw.

The technique to determine the index into the RGB table again harkens back to the "What's in a Bitmap?" column, where we discussed how the image of the bitmap is related to the RGB color table. Since we know how many colors are in the table and we know the format of the image data, we only need to determine the location within the image that the pel actually refers to.

Once we know the location, we take the value of the pel from the actual image data and—Viola!—we have our index into the RGB table.

The alternate method is a bit more

time consuming, in that because we can get the pel where the mouse pointer was clicked over, we can also match the color to one of the colors within the color table. Here we would have to loop through the table to match the colors.

Consider the following:

```
iClr =
    (BYTE *)((( pbImageBitmap +
    (cxBitmap * cBits + 31) &
    0xffffffff) >> 3) +
    xPointClicked)
```

This formula is used with a 256-color bitmap to locate the index into the color table. The alternate method would be:

```
for ( i = 0; i < 256; i++ )
    if ( argbBmp[i] == rgbClk )
    {
        iClr = i;
        break;
    }
```

The first method is much faster, especially if the color selected is the last element within the RGB table.

As for the actual pointer drawing, we should explain a couple of tricks we used for capturing and restoring the background where the test pointer is located. Knowing that we want to use the bitmap technique, and that speed is most definitely required, we create a single bitmap image that we reuse each time we move the test pointer. This action requires that we do something that is not actually condoned and can be most definitely frowned upon—but it does the trick!!

We get a presentation space handle for the desktop using **WinGetPS**

GUI Corner, cont'd on p.67

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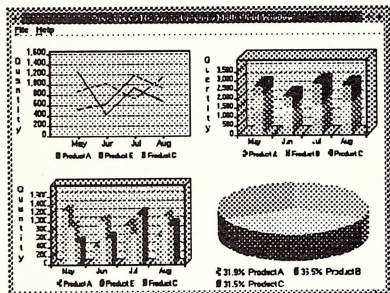
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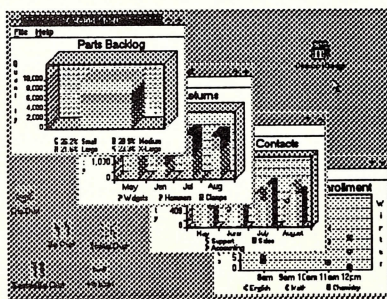
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GUI Corner, cont'd from p. 63

(HWND_DESKTOP). We use this presentation space handle each time we capture the bitmap and restore the original area. We don't release the presentation space until the testing of the simulated pointer is finished.

When we start the process of testing the pointer, we use the following mechanism:

```
Capture original mouse
position;
Capture area underneath test
pointer position
Draw the test pointer
while ( in test mode )
{
    if the mouse has moved
    to a new location
    {
        Restore the area where the
        test pointer was located
        before move
        Capture area underneath
        new pointer position
        Draw test pointer
    }
}
```

Next time

In the next issue, our column will take a little side trip across the Pacific to study Asian language enablement. So stay tuned until next month, as we discuss how you can double your fun with DBCS. **OS/2**

Mark Benge, IBM Software Solutions, RTP, N.C., is a staff programmer who joined IBM in 1989 and has worked on various CUA '91 controls for OS/2 2.x. He works in IBM open class library development, where he develops class library code for OS/2 and Windows. Mark has a B.S. in computer science from Western Carolina University. He can be reached on CompuServe at 73532,2063 or via the Internet at ban-zai@raleigh.ibm.com

Matt Smith, Prominare Inc., Toronto, Ont., is lead architect for Prominare Designer and Prominare Validator as well as the new IBM Universal Resource Editor. He has been involved with OS/2 since 1988. He has a degree in architecture from the University of

Waterloo and can be reached on CompuServe at 70363,1175 or via the Internet at msmith@prominare.com.

Resources:

You can download *bmp4.exe* from these electronic sources:

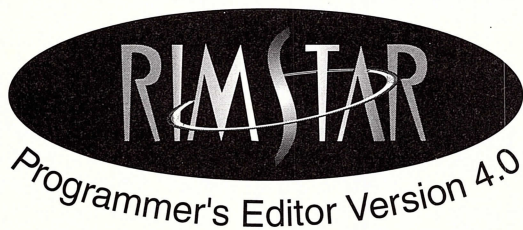
CompuServe's OS2AVEN forum (OS/2 Magazine Section).

File area 11 on the IBM PCC BBS, (919) 517-0001, OS/2 Tools section on the OS/2 BBS for IBM TALKLink customers.

FTP to *prominare.com* and log in as anonymous. The source is located in the */pub/prominare/guicorner-codecache* subdirectory.

Visit the GUI Corner home page at www.prominare.com/prominare/os2mag.vol3.num3.html.

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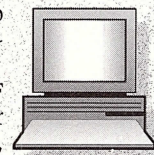
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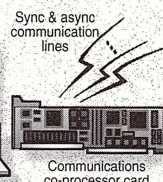
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Taxes and Communication

Taxdollars 1995, RhinoCom, Just Add OS/2 WARP.

BY BRIAN PROFFIT

Taxdollars 1995 (Planning 1.95B)

Tax time is approaching once again, and many of us are looking for ways to make the process as painless as possible. BT&T Consumer Technology offers a package designed to lure OS/2 users from products such as TurboTax, written for one of those other operating systems. I hope that in the future, I will be able to recommend TaxDollars for that purpose.

User interface

As you can see in Figure 1, TaxDollars presents a clear, friendly face when it's first opened. The information on the screen follows the format of Form 1040. As you get to fields that need additional forms to justify their contents, press "L" and TaxDollars automatically links to the form needed. You can also select any of the supported forms from the menu bar. Supported forms include Forms 1040, W2, 2106, 2441, and 8829. Supported schedules include Schedules A, B, C, D, E, EIC, R, and SE. Forms 1099 and 4562 are expected to be supported in the final version as well. (This review was done on the version of the product shipped to customers to allow planning of their 1995 taxes. The final version can't be released before March, as the IRS has until February 1996 to change the regulations on 1995 taxes, and possibly require changes to the program.)

The planning version was limited to 36 entries for Interest & Dividend Income, but it should be expanded to

Figure 1: The interface resembles the physical IRS tax forms.

Figure 2: What goes in the yellow entry fields??

100 by the time the final version is released. This quantity of entries is plenty for all but the most fanatic of diversifiers. The final version is expected to include state calculations for California, Illinois, New York, and North Carolina.

A nice user interface touch is the updating of window title bars to indicate the subtotals on the form presented in that window, along with a bottom line of the amount owed or due based on the information entered thus

far. The font selections, color coding, and hot keys were all selected to make the process as visually appealing and easy as possible. Printed output is extremely sharp and clear on an IBM 4019 300-dpi laser printer. It's difficult to detect a difference from the IRS preprinted forms. A **Final Review** option scans your return for entries that indicate a need to file forms that aren't included in TaxDollars, and an appropriate warning is issued.

On the other hand...

Those using computers to help with their taxes are also likely to be the types who use computers through the year to manage their finances. TaxDollars has no facility for importing data from finance packages, such as InCharge and Quicken.

Also, forms are not always linked as expected and implied. For example, line 8 of Form 8829 should contain the amount from Schedule C, line 29. However, TaxDollars failed to move the amount or to allow manual entry into the linked field. I was unable to override the field as a linked entry, the link was never made, and so it was not possible to complete Form 8829 properly. An option to display a graph of your income deduction categories is also included, but it failed to link properly to my information.

The program has many window repaint problems also. Changing window size might cause gibberish. In fact, just moving a window to the background and back to the foreground may cause garbage to appear.

As you open forms and schedules other than the 1040, they all appear in different windows. If more than one TaxDollars window is open, the contents of these windows become subject to garbling if partially covered by another window, and then brought back to the front of the desktop.

It isn't always clear what the program expects you to enter. Look at Figure 2 and decide what you are supposed to enter in the yellow entry fields at the top of the window.

Worst of all, though, TaxDollars made math errors. The program multiplied my three exemptions by \$2,450, and came up with a total of \$7,500! I later got an explanation about the math error. I was told that the programmers at B&T Technologies had changed the internal tables to reflect 1995, in which the exemptions are \$2,500 each, but didn't change the 1994-based forms. Thus, the form says multiply by \$2,450, but the program multiplies by \$2,500. I suppose I can give them a bit of a break on that point, but they couldn't explain any of my other problems.

Glee or flee

No, this isn't the final version of the 1995 program, and it's likely some of the problems I've mentioned will be corrected in the final one. But the product I reviewed is not beta code. The interface problems are difficult to work around by themselves, and it becomes even more difficult to plan your taxes properly with a program that creates math errors.

RhinoCom 1.5

The power of a 32-bit pre-emptive multitasking operating system such as OS/2 Warp should lend itself well to products such as terminal emulators. Rhintek Engineering agrees, and they're offering, RhinoCom, which does a good job of blending into the OS/2 environment.

Getting started

The installation program starts things off nicely by clearly describing exactly what changes will be made to your system. These changes include the new entries in the **Templates** folder for creating Rhino and Rhinodex objects, the

creation of the directory into which the program is installed, the addition of RhinoCom to *os2.ini*, and the fact that *config.sys* and *os2sys.ini* are not modified at all. Rhintek also included an uninstall program that backs out all of these changes.

But what are Rhinos and Rhinodexes? A Rhino is a dialing entry, an object that contains all of the information needed to make a connection to a host. These objects are organized into *Rhinodexes*, which are very similar to normal OS/2 Warp folders, but include alphabetic tabs. The ability to have multiple Rhinodexes allows you to organize your services in several ways. The fact that each Rhino is a distinct Workplace Shell object means that you can create copies or shadows of them and place them anywhere on your desktop, including on the Launch Pad. By so doing, a single click can launch RhinoCom and execute the startup script, dialing and logging onto the host defined in that Rhino.

The installation program interrogates your modem in an attempt to determine its type. While RhinoCom was unable to determine the precise make and model of the U.S. Robotics Courier v. Everything or Apex Data 14.4 data/fax v. 34 modems that I tested it with, it did establish initialization strings that correctly activated top speeds and error correction modes for each. In an interesting touch, the installation program stored the modem responses in a file, and if you fax or e-mail the contents of that file to Rhintek, they will send you a new version of RhinoCom with your modem's make and model automatically detectable.

A **Coach** facility was included to help newcomers become familiar with RhinoCom. This addition is a good idea, but I'd like to see it become more context-sensitive. It should change as the mouse pointer moves without requiring a button click. Also, more detailed information on menu entries would be helpful. This is offset, though, by the context-sensitive help available through the normal <F1> key.

Worse, though, is the fact that the coach window refuses to give up the foreground. You cannot go back and forth between the coach window and

the terminal window, because the coach obscures most of the terminal window from view. Basically, the coach is useful for getting you connected, but once you are online you have to deactivate it to see the host session. Therefore, it doesn't help with issues such as file transfers.

User interface

The Workplace Shell integration is good with the right-mouse button defaulting to activate pop-up menus. You can also customize both mouse buttons to perform various functions while inside the terminal window, including automatic activation of macros.

You have complete control over the number of rows and columns for the virtual terminal as well as for the window itself. The colors are also configurable. Default fonts are assigned, based on fitting 24 rows of 80 columns within your display resolution, but those fonts can be easily modified. I'd like to see Rhintek add an option to automatically resize the fonts as the user resizes the window.

The Workplace Shell integration is great, but it also introduces a concern: Given the fact that desktop problems do occasionally occur, I would strongly encourage Rhintek to include a command file that would rebuild all of RhinoCom's desktop objects.

Communication basics

RhinoCom provided excellent performance, with an average transfer rate of 3,039 characters per second (cps) on a 28.8kbps connection with a U.S. Robotics Courier v. Everything modem. This was the speed while running in the foreground. Running in the background, with a Win-OS/2 app in the foreground, the speed slows to around 2,880 cps.

RhinoCom stays out of its own way, so you can have multiple copies running to support more than one serial port simultaneously. You can bypass dialing by specifying that two systems are connected directly via a null modem cable. Terminal emulations include ANSI, DEC VT terminals, and Data General terminals.

File transfer protocols include not just XMODEM, YMODEM, and Ker-

mit, but also ZMODEM and CompuServe B+. You can also define a post-download script, which will be executed immediately after a download has completed. This option is great for functions such as unzipping and virus-checking new files. If you are doing a batch transfer, the script is run each time a file in the batch has been transferred. You have more detailed control over communication parameters than in most products. For example, RhinoCom has 11 configurable settings just to control ZMODEM file transfers. The default settings work just fine, of course, but it's nice that the advanced user is able to go to that level of fine tuning.

You control the size of the history scroll-back buffer, starting with a default of 100 lines. You can instruct RhinoCom to inform you when the buffer is about to overflow, allowing you to go into history mode and save text before it disappears. However, I'd prefer not to use the mouse to activate history mode. Rather, pressing the **Page Up** button should automatically start history mode and move back in the buffer.

A strange omission is that you can't quickly and easily make a one-time connection. If I'm only going to connect to a host once, I don't want to go to all the trouble of creating a new Rhino for it. I simply want a blank terminal window and an easy way to enter a phone number to dial. No default Rhino is added to the desktop, and the default configuration file isn't updated during installation to reflect the port at which a modem was found.

Add-ons

Rhintek thankfully chose to use REXX as its script language, and they included two dozen communications-specific functions to allow more complex scripts to be created. Key macros and named macros are supported. These macros aren't restricted, however, to just keystrokes. Macros can call other macros, call REXX scripts, make single calls to one of RhinoCom's REXX functions, execute menu options, and can even attach sound effects. Named macros can also be added to the Macro pull-down from the menu bar.

RhinoCom has a host mode that

you can use to start your own limited BBS, including private mail, public messages, and file transfers. No provision was made for multiple rooms or sections, or ANSI colors and graphics, but that isn't the main purpose. The product does include security, with the ability to define up to 10 different access levels that have various abilities to use the BBS.

The Line Monitor is an excellent communication debugging utility. It opens a separate window in which all line traffic is displayed. This access makes it possible to view the control codes going between the remote and host systems.

An interesting option that RhinoCom includes for extending or modifying communication functions is splicing into the communication stream. A splice is a dynamic link module (.dll) that the user can load from a file menu. The splice sees the data as it passes between the serial port and RhinoCom, and it can perform various filtering functions, such as encryption or virus checking. RhinoCom comes with a sample splice that uses the data stream as input/output for two people to play Battleship on separate computers.

Glee or flee

I like the object-oriented aspects of RhinoCom and the ability to create shadows of specific Rhinos for easier starting. Corporate information systems departments may also prefer RhinoCom because of the flexibility possible through writing custom splices. I also like the communication speed. In my earlier review of HyperAccess (HA), I expressed some disappointment in its speed (using HA's default packet size of 512 bytes). Bumping it to the maximum of 1,024 bytes, the speed was greatly improved. Still, RhinoCom's ability to handle 2,048-byte packets gave it a speed edge over HA. On the other hand, the list price of HyperACCESS is \$70 less, and the package provides many things missing from RhinoCom, such as the cus-

tomizable button bar, more than a dozen predefined online services in the phone book, exhaustive lists of other bulletin board and service sites, a generic BBS entry, and a more complete set of additional REXX functions for powerful scripting. HyperAccess also includes the HyperViewer graphics display program, TCP/IP support (including Telnet support), and a Message Pad.

If speed is all you care about, or if you're the type of person who will actually write and distribute customized DLLs to filter the data, RhinoCom has the edge. But overall, most people will find HyperAccess to be a better value.

RhinoCom home edition

Rhintek has also released a home edition of RhinoCom. The home version only has ANSI and VT100 emulations (sufficient for most needs), and XMODEM, ZMODEM, and CompuServe B+ file transfer protocols. Scripting and named macros are also removed from this version.

For those who don't need these extras, RhinoCom Home retails for \$100 less than the standard version, with a suggested retail price of \$99.

Just Add OS/2 Warp

In a surprisingly direct attack from IBM, Just Add OS/2 Warp (JAOW) is a new product pointed squarely at converting users of Windows to OS/2 Warp. I use the term, product, loosely here, since JAOW isn't for sale. Instead, IBM fervently hopes to get a free copy into the hands of every possible Windows user.

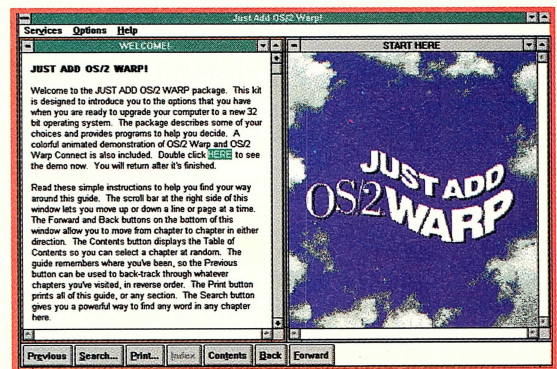


Figure 3: Just Add OS/2 Warp presents itself as a Windows help.

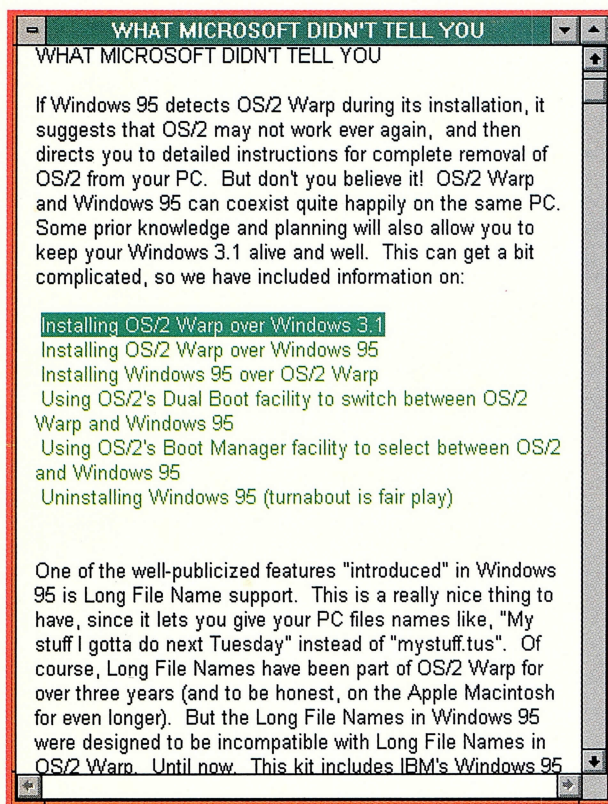


Figure 4: JAOW takes on Redmond rhetoric directly.

Perhaps the best categorization of JAOW is hype-buster. Its whole purpose is to battle the incredible marketing campaign surrounding Windows 95. A representative quote: "Today's OS/2 Warp is what Windows 95 might become with a few more years of sorting out." In particular, a section called "What Microsoft Didn't Tell You" takes on Redmond rhetoric directly. The Windows 95 installation program displays ominous-sounding warnings about the future of your system if it detects OS/2 on your disk and strongly recommends that you remove OS/2 before proceeding with installation. JAOW points out that this action is quite unnecessary, as the two operating systems can reside quite peacefully together. JAOW includes detailed instructions on making that happen. The Dual Boot program is included in JAOW, as well as a utility that allows long file names created with Windows 95 to be read and used with OS/2 Warp.

The program itself takes the form of a Windows help file. It includes background information on OS/2 Warp and the BonusPak, as well as reasons why you might prefer OS/2 Warp to

your system should run OS/2 Warp properly. The program checks your processor, memory, disk space, disk drives, video adapter, and mouse. The Upgrade Advisor correctly identified the components of most test systems but failed to locate an Adaptec 1542B SCSI adapter (which is fully supported by OS/2 Warp), and only found 16MB on a 32MB system (part of OS/2 Warp's known confusion handling memory above 16MB). On one system with an onboard S3 864 PCI connection, the Advisor correctly identified the chip and gave the phone number and download instructions for video drivers if the chip was actually a different S3 version.

JAOW includes specific installation instructions to allow OS/2 Warp to co-reside with Windows 3.1 or Windows 95. Because many systems are now shipped with Windows 95 preinstalled, JAOW also includes instructions for uninstalling Windows 95 once you're convinced.

Additional information on JAOW includes the February 1995 edition of the Warp Frequently Asked Questions help file, a Warp Connect Q&A file, an interesting collection of Stupid Warp Tricks, and the IBM Worldwide Elec-

tronics Resource Guide (a list of online services, Internet sites, and bulletin boards). In the perfect final touch, JAOW includes a command file to remove itself.

Glee or flee

The readers of OS/2 Magazine likely do not need JAOW to sell them on the benefits of OS/2 Warp. On the other hand, you may have bosses, coworkers, Information Systems departments, friends, and spouses that still prefer Windows. This free package is a great marketing tool in your attempts to enlighten them. **IS/2**

To try to alleviate concerns about hardware compatibility, JAOW includes The OS/2 Warp Upgrade Advisor. This program scans your system and tries to identify all of its components. A report is displayed, letting you know if

your system should run OS/2 Warp properly. The program checks your processor, memory, disk space, disk drives, video adapter, and mouse. The Upgrade Advisor correctly identified the components of most test systems but failed to locate an Adaptec 1542B SCSI adapter (which is fully supported by OS/2 Warp), and only found 16MB on a 32MB system (part of OS/2 Warp's known confusion handling memory above 16MB). On one system with an onboard S3 864 PCI connection, the Advisor correctly identified the chip and gave the phone number and download instructions for video drivers if the chip was actually a different S3 version.

Glee or flee

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Brian Proffitt was part of IBM's OS/2 team and left IBM to become the director of PC Week's Corporate Labs. He is now the president of Visionary Research, senior contributing editor for OS/2 Magazine, and solutions advisor to PC Magazine. E-mail him at 75300.1466@compuserve.com.

Resources:

Just Add Warp

IBM Corp.
America Online keyword OS 2, library Demos section
CompuServe GO ADDWARP
Internet <http://www.austin.ibm.com/psinfo/drk95.html>
READER SERVICE NO. 111

RhinoCom 1.5 (\$199)

Rhintek Inc.
(410) 730-2575
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Fax (410) 730-5960
BBS (301) 596-5618
CompuServe GO RHINTEK (PCVENC section 4)
Internet <http://www.rhintek.com/rhintek>
READER SERVICE NO. 112

Tax Dollars 1995 (\$17.95)

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(714) 363-7185
(800) 672-8293
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READER SERVICE NO. 113

Hockware's VisPro/REXX 3.0

Visual REXX keeps getting better. **BY RICK KRUER**

While OS/2 lacks Window's Visual Basic with its numerous add-ons, OS/2 users are fortunate to have a few products to choose from in the easy-to-use Visual Programming category. One of the more popular visual REXX products is Hockware's VisPro/REXX. This latest upgrade to version 3.0 is the third major revision for the product since its introduction in April 1993.

Marketed primarily as a visual design tool for programmers writing REXX programs for OS/2, VisPro/REXX makes graphical programming easy. Although it helps to be well versed in the REXX programming language, this product actually generates the difficult part of the program using very powerful WYSIWYG (What You See Is What You Get) tools.

REXX, of course, is the standard programming language that is built into every copy of OS/2. REXX is a simple programming language for writing both stand-alone utility programs as well as macros to extend the capabilities of other programs, such as the OS/2 Enhanced Editor. The only limitation to standard REXX is its text-mode-only look (similar to a DOS or OS/2 command window). The VisPro/REXX tools provide the capability to extend your REXX programs by opening up the world of Presentation Manager (PM) and Graphical User Interface (GUI) programming.

If you are an experienced programmer in OS/2, is there room in your toolbag for VisPro/REXX? Consider this: Prototyping of advanced OS/2 applications is possible very quickly when using VisPro/REXX. Hockware's

project design and advanced Team development features make switching the final application to C or C++ very easy. The timesaving power of this capability is excellent.

When using WYSIWYG tools with VisPro/REXX, the design of the program visually becomes so easy that creativity seems to flow naturally. New programs are created by dragging and creating a new **Project** from a template, while windows are created by using a new **Form** template. Events and actions are created simply by dragging and connecting an object to a code window.

Most of the objects you'll need to write your program are available. Hockware wrote the program to conform to the Common User Access

(CUA '91) interface guidelines. Besides being visually designed, the advantages to using this product are the visual extensions, which VisPro/REXX provides to standard REXX programs written for OS/2. Normally, OS/2 REXX programs have been text only, but now usually consist of very sophisticated, event-driven PM GUI programs with CUA '91 objects that have the simplicity of the REXX language.

Bronze and gold

Hockware packages VisPro/REXX in two distinct editions: Bronze and Gold. While the price difference is dramatic (\$59 vs. \$299, respectively) most users will know which version they need.

For those new to REXX and programming, VisPro/REXX's entry level

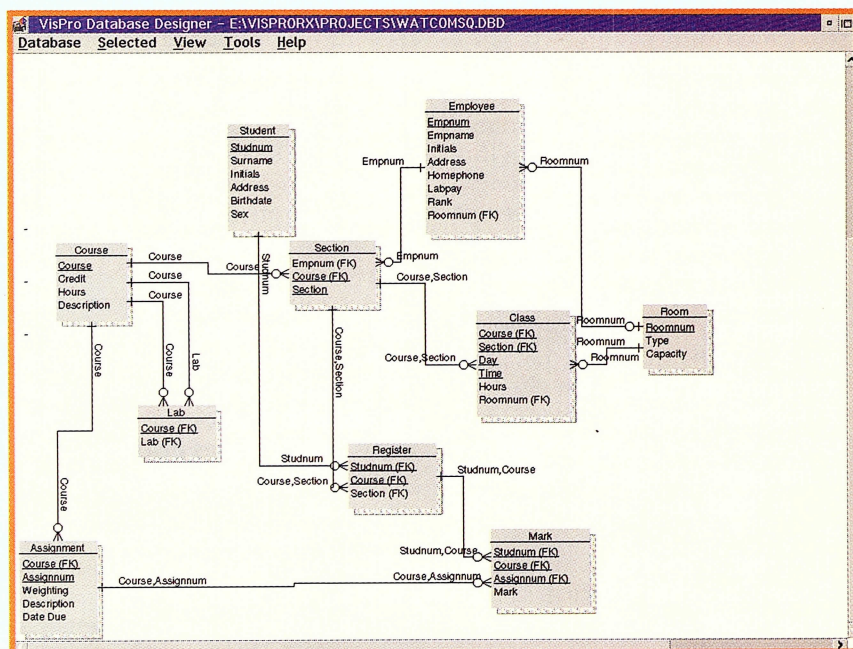


Figure 1: The new visual database designer's Entity/Relationship diagram is a nice feature.

edition is called Bronze. This version does not include the advanced features, such as the Database Designer, but is a superb value for anyone interested in programming with REXX. Plain, ordinary REXX programs may be easily turned into graphical PM programs with this version. One of the nice features for beginners, which encourages learning, is code templates. If, for example, you want to read a file, but aren't sure of the REXX instructions, simply click on a button to add the prewritten code for the job. This is a very nice feature, even for those of us that might know the REXX language but are experiencing memory fatigue due to lack of sleep (or coffee).

Those of you that may be familiar with VisPro/REXX and are upgrading from a previous version will be happy to work with the new Visual Database Designer (Gold version only). This tool allows for visual design, reverse engineering, and database code generation. Figure 1 shows the Entity/Relationship diagram of a sample database shipped with the product. This database is created with the Watcom SQL product, which is used to demonstrate advanced database constructs. Using the visual database designer tool, it's a trivial matter to drag-and-drop the sample database onto a VisPro/REXX program that will permit instant access to the fields defined in the database. All the code is generated automatically when you drag-and-drop the database onto a VisPro/REXX form, including the difficult one-to-many scenario.

Another feature available in the Gold version and new to version 3.0 is Team Development Administration. This is a built-in backup/restore/audit capability that is automatically activated whenever the product is used. The great part about this feature is that you don't even know it's there until you need it for recovery. Backups of components to the project are automatically made, and an audit entry is

made in the *log.vpl* file when changes are made to a VisPro project. Using this feature permits many programmers to work on the same project without conflict. Logical comparison of different program versions and backout (roll-back) capability is also provided. This feature is extremely powerful, yet rarely publicized.

Diving in

VisPro/REXX may be an effortless application to install and work with, but what about that crucial time after the install when you are trying to learn the product? Samples are critical then, and Hockware has done a good job providing a wide variety of them. Figure 2 looks at the 16 samples that come with the product as both executable and source code. The learning procedure is straightforward: Run the program to get familiar with its operation, then examine the sample source code to figure out how it works.

A very simple sample, called VetBill, is used as an exercise in the manual, leading into a more complex sample, called MLS, with multiple windows

and advanced programming techniques. One of my only complaints about Hockware's VisPro system is that its documentation tends to be more of a reference manual than a user's guide. The two chapters in the manual meant to function as a tutorial are OK, but not great. Some of the instructions in the tutorial chapters are a little vague, especially if you are new to the product terminology. Although Hockware is nice enough to provide the tutorial exercises in the manual as completed samples on disk, the code from the book and the provided samples do not match. New user-oriented documentation and tutorials are where Hockware could stand a little improvement.

The extent of the rest of the samples are both diverse and interesting. Included is a sample text editor application, samples of programming drag-and-drop, threads, multimedia, and database access. The sample refers to a database in DB2/2, but Hockware's products support any database written to conform to the ODBC standard (including DB2/2, Oracle, and Watcom SQL).

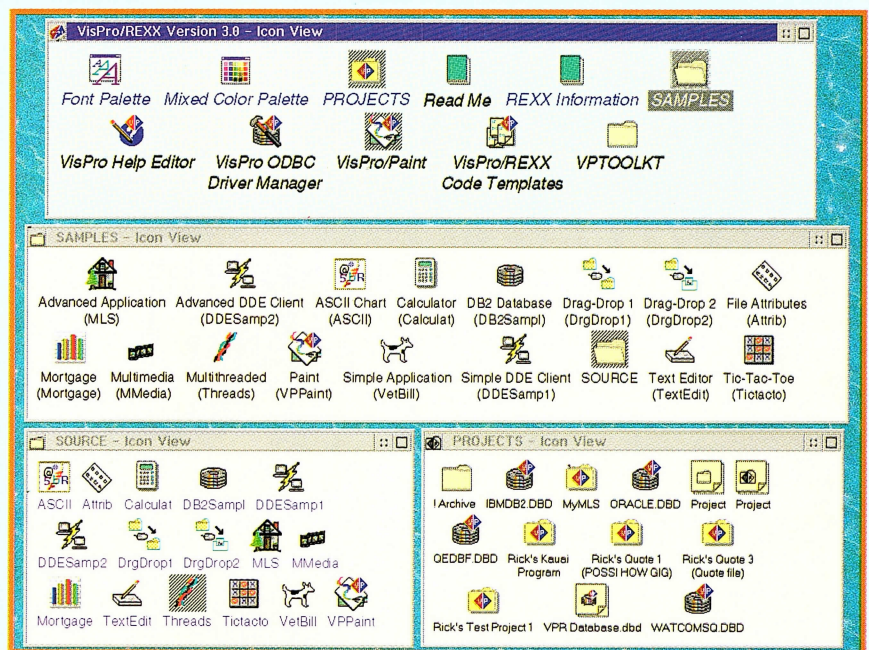


Figure 2: VisPro REXX comes with a large number of samples.

Operation and usage

Let's now explore the process used to create a VisPro/REXX program. Because the product is integrated with the Workplace Shell, we start by dragging and creating a new Project from the project template. Wait! Red Flag! Was my new Project a Workplace Shell folder on the Desktop? What would happen to the code I would be working on if the Desktop became corrupt or was replaced using the new Recovery feature of Warp? My concerns were alleviated after examining what Hockware had done. The new project was created in a shadow of the **Projects** folder of the **VisProRX installation** folder, not the Desktop. Easy to backup and not dependent on the OS/2 Desktop structure, this is a great example of Hockware's concern for real-world usage throughout this product.

After renaming my project to "Rick's Hawaiian Vacation Wish Program," I began by opening my new project folder, which was now populated with about seven objects that I could use to design my masterpiece. The **Main** form is very important; it is the main window of the new program and must always be present. Double-clicking on **Main** will bring up the VisPro graphical program designer. Figure 3 shows the layout view of one of the sample programs (Mortgage). VisPro/REXX supports four views to be used in the course of program development: **Layout**, **Event**, **List**, and **Settings**. **Layout** view is useful to graphically design objects, **Event** view is great for connecting objects with event action code, **List** view lists each object defined in the form, and **Settings** view is used for options. The suggested procedure is to visually define all your objects in **Layout** view and then use **Event** view to tie the objects to the code necessary to make the program function properly.

Drag-and-drop may be used to place objects on a form in **Layout**

view as well as to define event actions in **Event** view. Continuing with my program project, and after all the connections of my new program are complete, I select **Run Project** from the file menu of the **Main** form. VisPro/REXX generates control and resources for all of my objects, connects action code to events that can occur (such as mouse click), and runs my new creation.

Run is meant to be a quick test run of your new application. For final output, the **Build** option will generate a stand-alone .exe file, which is your new application program. This generation has a few interesting options. First, you must decide if your program can run stand-alone (without supporting .dll) or if it should require the .dll (Hockware supplies all the .dlls needed). Stand-alone applications are larger but will run without you having to worry about coordinating versions of the supporting .dll file on your user's system. Smaller applications (with .dll) are what their names imply (smaller), but require coordination of the supporting .dll. Hockware's VisPro .dlls can be dis-

tributed with your finished application royalty-free. Another nice **Build** option is the ability to tokenize or encrypt your finished program. This feature is useful if you desire to keep your REXX code safe from prying eyes.

Once your application is done (oh, I forgot to tell you that a programmer's creation is never done), the changes to an application are easy. Simply open up the **Main** form again and have fun. Eventually, you may be interested in viewing changes recorded in the file *log.vpl*, which resides in your **Project** folder. Opening this file will bring up the Team Administrator tool where you can see all the changes made to your application. This stuff is extremely cool. (I wish I had a tool this nice on my Mainframe MVS system!)

Since most programmers like programming and dislike writing report output, Hockware's REXX-enabled visual report writer product, called VisPro/Reports ("Visual Report Writing," November 1995 p.48), makes an excellent add-on to VisPro/REXX when there is a need for quick output reports.

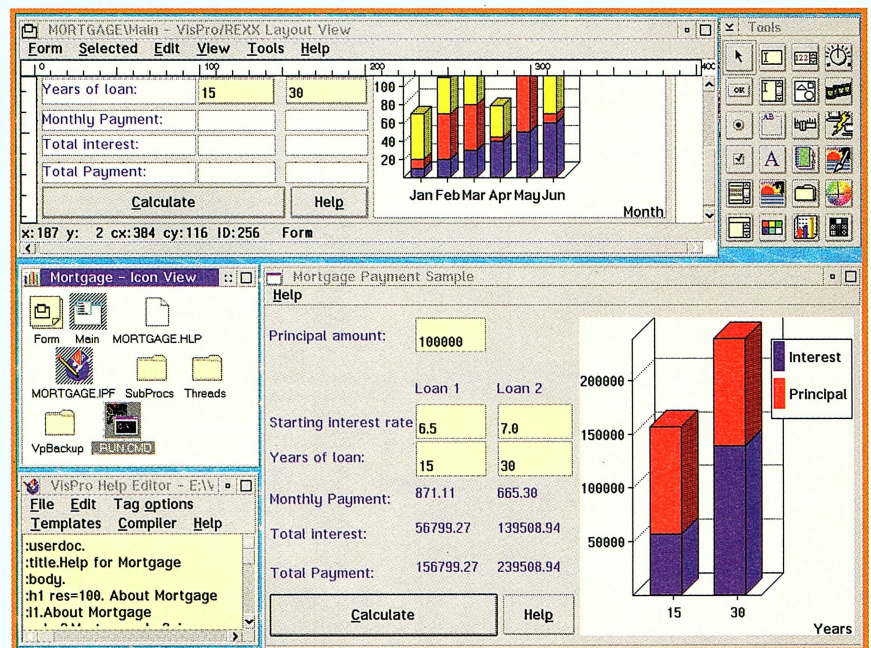


Figure 3: This sample program (Mortgage) shows some of the graphical possibilities.

New and Improved Features

If you are already using VisPro/REXX, here are some of the new and improved features included in the VisPro/REXX 3.0 release:

Improved Graphical Program Designer is fully integrated with the OS/2 Workplace Shell and has extensive drag-and-drop capabilities. REXX programs may now include multiple threads and procedures (shared subroutines).

Improved programming power uses CUA '91 objects with more API (Application Program Interfaces). It's now possible to interact with more objects to make robust, commercial quality applications.

Improved multithreaded debugger with expanded support for conditional break points makes testing complicated programs more productive.

Improved Graphical Database Designer provides entity-relationship diagrams, showing all column names in tables with clearly marked relationship labels. Database access code can be generated by simply dragging and dropping a database table onto a VisPro/REXX form. This function creates GUI panels for adding, changing, deleting, and searching for rows of data in a table.

Improved compatibility of Projects components across all VisPro products & languages means that prototypes created in REXX can easily be moved to C or C++.

New VisPro Team Administrator provides Team Development, Recovery, and Audit features, which allow programmers to clearly and easily compare change levels in projects. All project changes are logged, and unwanted program changes (or bugs) can be removed using the rollback facility.

Performance, reliability, tech support

Try as I may to uncover some elusive flaws, after many weeks of working with VisPro/REXX I was only able to find a single bug, which turned out to be a limitation in OS/2 Presentation Manager controls. As a test, in preparation for this review, I called Hockware technical support on a late Friday afternoon. Calling as an innocent anonymous user seeking help from VisPro support, the technician answered all my questions about the product and was very helpful, recording my problems and suggestions in a database for tracking. Turns out, my technical contact was Dave Hock, president of the company, who told me that the customer tracking system is written using VisPro/REXX. He made it seem that Hockware is very interested in customer satisfaction, providing little bonuses such as automatic, free minor updates and follow-up on suggestions and comments. The reason, I

was told, that the Hockware folks enter all problems and suggestions into the database is so they can notify its customers when that fix and/or suggestion becomes part of the future product. Wow, was I impressed! Only time will tell, but Hockware's attitude toward its customers is excellent.

Bottom line

HockWare has a great product with its latest upgrade to version 3.0. VisPro/REXX is a powerful, but easy-to-use, visual programming interface that is understandable by beginners and useful for the most advanced programmer. Because the documentation provided is more of a reference manual than a user manual, there is still a need for more beginner-level documentation. I would like to see a user's manual include a tutorial section on the REXX language itself, a section on the basics of event-programming (specifically Presentation Manager), and a hand-holding section on the more dif-

ficult facilities in the VisPro/REXX product. To Hockware's credit, it has an interesting Internet Web site (<http://www.hockware.com/hockware>) and a forum on Compuserve (*go Hockware*). The VisPro family of products integrates nicely and makes moving from a working VisPro/REXX program to C/C++ a dream.

The Bronze (entry) version of VisPro/REXX is so bargain priced that every OS/2 user with an interest in REXX or programming should get this product. Graphical versions of REXX programs are so much more interesting than that boring "text only" look. The more advanced Gold version of VisPro/REXX has the professional features that more experienced programmers need, such as Team Administrator and Database Designer. Overall, the VisPro/REXX product has a robust interface and is easy and fun to use. The capabilities of this product, its integration with the rest of the VisPro family, and its company, Hockware, appear to be winners in every way. **OS/2**

Rick Kruer is a certified OS/2 engineer, consultant, college instructor, and writer. He has a background in systems development on large mainframe computers and is president of Computer Miracles. Rick may be reached via the Internet at rick@computer-miracles.com or at Compuserve 74147,3230.

Resources:

VisPro/REXX 3.0

Gold (PRO level \$299)

Bronze (Entry level \$59)

System requirements: OS/2 Warp, 5MB memory, 1.5Mb hard disk space

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READER SERVICE NO. 140



Directory Services and Security—Eventually

BY WAYNE RASH, JR.

The good news is that IBM has decided that LAN Server needs real directory service and security. The bad news is that you might not be able to get your hands on it for a while. The good news is that it's really on the way and when it gets here it might actually work!

If this good news/bad news story sounds like a weak attempt at humor—it is. Unfortunately, neither directory services nor security is a laughing matter to companies that need them. Both a good directory service and a credible security system are vital for companies planning to use a network operating system in an enterprise environment. But, IBM hasn't delivered either with LAN Server or the soon-to-be-shipped OS/2 Warp Server.

To make matters worse, the choices that exist for giving managers security and directory services don't fit particularly well with companies that are running LAN Server as their network operating system of choice. The way things are right now, a network manager has several choices that might be viewed as less than optimal.

Finding a service

The problem is that none of the available directory services really took advantage of OS/2 or LAN Server, even though they worked in these environments. More importantly, security was less robust than many users would like. Fortunately, a good directory service and a good security service can work well together and can complement each other nicely. That's what IBM has in mind for its new Directory and Security Services (DSS) when the product is released, probably in mid-1996.

The idea behind IBM's DSS product is

to replace LAN Server's (and OS/2 Warp Server's) current security with a version that is significantly more robust, and at the same time, avoid a number of problems inherent in most LAN-based security systems. For example, when DSS is available for LAN Server, companies can have third-party authentication and password encryption. Likewise, passwords won't pass across the network, so they can't be compromised by someone with a protocol analyzer (a hardware testing device for networks that allows its user to view the contents of network data packets).

What's probably even more important, however, is that IBM's approach will meet ISO standards, which means that it will work in an open multivendor environment. In short, other vendors who have adopted similar standards for their UNIX and Microsoft Windows NT networks can interoperate with an OS/2 LAN Server network.

Directory services

As important as security is for many enterprise network managers, it's not the only weak point that has plagued them because of LAN Server's directory service limitations. While network managers could set up some of the features of a directory service with LAN Server's domains, it was only a partial solution. For example, a distributed database didn't really exist for all network objects, including resources and users.

The lack of a real directory service means that even though users can usually get a single log-on to anywhere on the network, it's nearly impossible to make sure they can access the same resources from anywhere on the network.

Until now, those approaches have

mostly been proprietary. Novell's NetWare 4.1, for example, uses the company's NetWare Directory Services, which the company says is compliant with the X.500 standard for directory services. That doesn't mean it meets the standard, however, and other X.500 directory services can't currently interoperate with Novell's.

A few open systems are available that embody some aspects of directory services, such as the widely used Domain Name Service, which is popular in the UNIX world. Likewise, there's IBM's DCE, which provides some of the same functionality as a directory service. Where other vendors have approached this range of standards by remaining proprietary, IBM's approach is to support all of them. This support helps ensure a solid base of interoperability for IBM's directory service when it eventually ships.

A new approach

In order to manage network directories and security, without changing everything that LAN Server administrators have learned throughout the years, IBM is designing DSS so that it superimposes a new layer on top of the existing domain structure. The new layer, known as *cells*, allows administrators to merge multiple domains into a single cell for administrative purposes. Users won't see any difference because they'll still use the domain names they're used to using. Cells will minimize the impact on training and on applications written for the older system.

On the other hand, if an administrator chooses, the new DSS client software that IBM is developing for use with its new directory and security services will

The Network Connection

allow users to access any domain within single or multiple cells. This choice can broaden the flexibility in an enterprise environment where there might be a number of domains set up for organizational or geographical reasons. It can also supply a broader range of access for users who need it or simply need to get at data on a server in another domain. This level of access depends on using DCE, however, so current client software would have to be replaced according to the needs of the user.

Should you wait?

One downside to all of the features promised for DSS is that they're not here yet. In fact, they might not be here for months (at press time they were in such experimental condition that we never were able to use the pre-release version of the product IBM sent us). Because of this, and because it's unlikely that large enterprises will be willing to trust their networks to an untried product, it could pay to evaluate options.

For example, even though Novell NetWare's NDS isn't an open system,

the current release of NDS is stable, flexible, and effective. Likewise, Novell has solved most of the issues relating to enterprise-wide security. According to IBM's DSS product manager, Sandy Carter, Novell is already working with Hewlett-Packard on a DCE solution that allows NDS and DSS to interoperate.

A Novell solution has the potential to meet the immediate needs that IBM's DSS can't meet and eventually work with DSS once it's delivered. Managers with access to UNIX-based networks can continue to use their DNS approach and simply add IBM's DSS to their DNS solution when it becomes available.

Even more important, Carter says that IBM is going to be providing sophisticated migration tools. So, once DSS is shipped in a form acceptable to enterprise network managers, moving the network to IBM's solution should be fairly easy to accomplish. The ability to migrate later, as well as to interoperate later, is important because it means that today's users aren't trapped in what might become dead-end solutions if their company needs change.

They can adopt an approach to directory and security now, and be comfortable knowing that if their needs change later, they can change with them.

Either way, both security and directory services are vital to the integrity of enterprise networks. Fortunately, network managers now know how to meet both needs for OS/2-based networks. **OS/2**

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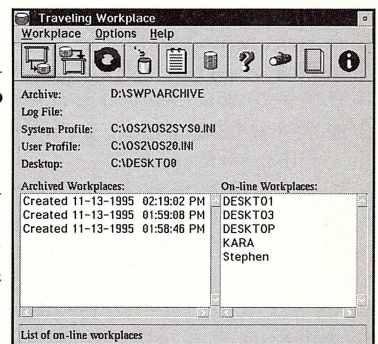
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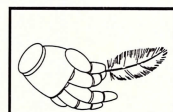
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Getting Your Priorities Straight

BY MARK MINASI

Last month we discussed the simplest method whereby OS/2 multitasks—timeslicing. Timeslicing divides up the processor's time into very small increments and then switches it from task to task. The magic of this process is that the time increments are so small that the human user, who thinks and perceives units in dozens of milliseconds, will be fooled into thinking that the computer, which perceives time in fractions of milliseconds, is doing several things at once. In reality, the computer is only doing one thing at a time. As I mentioned, the important tuning parameter for timeslicing was the `TIMESLICE=` parameter in the `config.sys`, a value that can range from 32 to 65,535 (the units are in milliseconds).

Simple timeslicing isn't that effective, however, because it is too egalitarian, giving all applications an equal shot at the CPU, which is probably not what you want. For example, if you're running an e-mail program in the foreground and have a virus checker running in the background, you really don't want the e-mail program to get as much CPU time as the virus checker. Rather, you want the e-mail program to get more CPU time. This example shows why OS/2 doesn't use a simple timeslicing system such as basic timeslicing; it wouldn't be an efficient use of your processor's power.

It's possible to improve on timeslicing by adding the notions of a priority and a state. OS/2 recognizes 128 different grades of priority and several states. So, a process's state answers the question, "If the kernel gave you CPU time right now, would you get anything done with it?" To illustrate, take the

OS/2 doesn't use a simple multitasking system such as basic timeslicing; it wouldn't be an efficient use of your processor's power.

case of my e-mail program and the fact that the program spends most of its time...waiting. In fact, most interactive programs, such as word processors, spreadsheets, e-mail programs, and other personal productivity applications, spend most of their time waiting for keystrokes from you. If OS/2 gave CPU time to your word processor while the word processor was waiting for a keystroke, that would be wasted time.

On the other hand, when a keystroke is waiting for your word processor, you want the system to respond fast.

You might say that we want just-in-time multitasking. When the OS/2 kernel starts dividing the CPU's time between applications, it looks at all the candidate applications, examines their priorities, and finds out whether or not they're ready to run. It ignores the

processes that aren't ready to run, such as ones waiting for the keyboard or the printer, and finds the ready-to-run process with the highest priority—that process gets the CPU's attention for a timeslice. When the timeslice is up, the OS/2 kernel begins again by examining all ready-to-run processes and awards a timeslice to the one that is highest in priority.

The 128 priority grades are divided into four groups called levels. These levels are divided into 32 classes. A program's priority is stored by the system as a two-byte hex value. The high-order byte stores the numeric value for the level, and the low-order byte stores the numeric value for the class. For example, if a program were of level 2 and class 5, then its priority value would be (in hex) 0205. Run the `PSTAT` command and you'll see a column for priorities (they're formatted as four-digit hex numbers). But let's look some more at this prioritization scheme.

Programs are prioritized into one of four classes: **Idle**, **Normal**, **Server**, and **Time Critical**. The corresponding hex values are 01xx, 02xx, 03xx, and 08xx. (where xx is the class value). These names are in and of themselves meaningless. The following explains what IBM was intending when they created these levels.

Most programs get the **Normal** priority grade. Their priority values range from 0200 through 021F (priority level value of 02 and class value ranging from 0 through 31). Many internal system programs also run at 0200 or thereabouts, so it's almost a certainty that a **Normal**-level program will be around at any moment. DOS programs have a **Session** priority setting

Under the Hood

in the DOS Settings, which lets you play with the class of the DOS process. This addition is relatively recent to OS/2's DOS support, first appearing in OS/2 Warp. An easy way to change classes or levels for OS/2 applications does not exist if you don't have that application's source code.

The preponderance of **Normal** programs doesn't bode well for the **Idle** class, which ranges from 0100 through 011F in value. An **Idle** program will never run unless all of the **Normal** programs are waiting around for something. When I first heard of the **Idle** class in 1987, I thought it was a great place to put a whole class of utilities.

For example, consider the disk compression programs around such as **Stacker** or **DCF/2**. These programs must compress and decompress data on the fly, so they don't have time to do really heavy-duty compression. If they had more time, they could do more extensive compression that would lead to more free disk space. However, heavily compressing a file means it will take more time to decompress. Maybe it's not such a good idea after all, unless you've got an **Idle** process. So, just build an **Idle** process that examines the **last time accessed** date on a file (this only works on HPFS and concentrates on the files that haven't been touched for six months or so). When nothing else is running, the **Idle** process could do some sizable pattern analysis and could re-compress the lesser-used files. A virus checker is another potential use for **idle**—just scan files in the background.

The problem with **Idle** class programs, however, are DOS applications. It's hard to tell when a DOS application is idle, as most DOS applications are built to just poll the keyboard when idle. To see this function, run almost any DOS application in a window and run the Pulse system utilization tool in another window. Notice that even when the DOS application is idle, it'll spike the CPU utilization values all the way up to 100% and keep it there. (You can address this response, with the OS/2 **Idle Sensitivity** DOS setting.) As a result, running most DOS programs pretty much guarantees that your idle processes will never see the light of day unless you hand-

tweak all of their **Idle Sensitivity** settings. Hence, you don't see too many **Idle** programs.

Next up is **Server** priority, values 0300 through 031F. It's intended for processes that always need to be awake and around when messages are waiting for them. The most obvious example is an application server process such as a database application. You don't want a word processor to use CPU time when you're not typing into it but rather a fast response when typing into it. Thus, client PCs want a quick response from a server application.

Server priority is multitasking nitroglycerine. When I first started playing with OS/2 1.x, I wrote a small C program that allowed me to dial in whatever level and class I wanted. This way I could see how different priorities would affect performance. The program was a very simple looping program, so it didn't wait around for keyboard input, communications, or the like, and so was always ready-to-run. When I set it to level 3, I found that I couldn't do anything anymore—**Ctrl+Esc** did nothing. I then realized that I'd assigned an application program a higher priority than the one used by the operating system.

Finally, the **Time Critical** level, values 0800 through 081F. If **Server** priority is nitroglycerine, **Time Critical** is antimatter. It's only used in those cases when your process cannot be interrupted and must be executed. According to IBM, **Time Critical** priority is used when doing lazy writes and some virtual memory management functions.

Four levels and 32 classes produce 128 grades of multitasking priority. Let's consider ourselves fortunate that no application programmer's ever decided to speed up his spreadsheet application by setting the spreadsheet to priority 081F.... **OS/2**

Mark Minasi has been a consultant and educator in the fields of advanced PC operating platforms and PC technology since 1984. He is a contributing editor for Compute, BYTE, and OS/2 Magazine. You can contact him at CompuServe 71571,264 or via the Internet at mark@smtphost.mmco.com.

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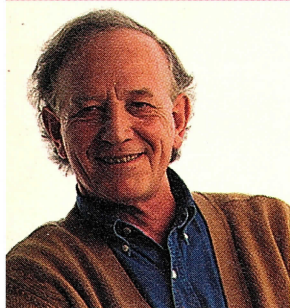
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Son et Lumière

BY STAN KELLY-BOOTLE

To reflect the happy marriage between *OS/2 Magazine* and *OS/2 Developer*, "End Notes" will now offer a wider range of book reviews. So far, I've mainly been looking at books for the OS/2 user rather than for the OS/2 programmer, although, it's no longer easy to draw a strict line between the two. The advances in component software, macro and scripting languages, and visual programming tools will increasingly blur the traditional user/developer categories. With this in mind, my reviews will endeavor to hold the attention of our newly merged readership and deal with the broader issues affecting the OS/2 community.

Another change in my strategy, forced by the publicational ferocity of the computer book trade, is that I plan to review more than one book a month.

My accelerated regime starts now with two books for OS/2 programmers from John Wiley & Sons: *Developing Multimedia Applications Under OS/2* by William Lawton, Bradley Noe, and Marcelo Lopez, and *Programming the OS/2 Warp v.3 GPI* by Stephen A. Knight and Jeffrey M. Ryan. (GPI is the Graphical Programming Interface, part of the OS/2 Presentation Manager).

Although the two books cover different aspects of OS/2 programming, they have much in common. First, they are unique within their respective fields. Apart from the various IBM manuals, these two are the first tutorial trade books devoted to MMPM/2 (Multimedia Presentation Manager) and GPI, respectively. Second, both sets of authors are active OS/2 programmers working for IBM, so each book carries the authority of inside expertise. Third, both books reveal their secrets through cumulative

sample programs with source code disks. Finally, the books share two other properties that are almost too obvious to need reporting: they both fly the official IBM OS/2-accredited flag, and both cost—drumroll—\$39.95.

Programming the OS/2 Warp v.3 GPI assumes a prior acquaintance with PM programming. (Lacking this familiarity, you could try Stephen Knight's *Learning to Program OS/2 Presentation Manager by Example* or Michael Drapkin's *OS/2 Warp Presentation Manager Mentor*, both from John Wiley & Sons.) After a brief but entertaining look at the OS/2 architecture, the authors dive into the GPI nuts and bolts with chapters on Graphic Primitives, Fonts, Transformations, Paths, Regions, Clippings, and other GPI building blocks. The book concludes with chapters on Printing Graphics and OS/2 MetaFiles. Each topic is illustrated with real working source code from the authors' Graphics Editor, which you can install and run from the disk provided. It's quite a respectable drawing application, complete with tool palette and menu. An added bonus for GPI learners is that you can select part or all of a drawing and list the graphics instructions that produced the selected item. The book does not claim to cover every function in the GPI, but it reveals the beef in a most elegant and readable manner.

Developing Multimedia Applications Under OS/2 also requires previous OS/2 programming experience upon which the authors patiently load layer after layer of daunting acronyms, file formats, and APIs. The sample application, a waveaudio (PCM format) player/recorder, gives you a sobering peek under the hood. The source is provided on disk and analyzed in detail in Chap-

ter 11. Well, there's no hiding the increasing complexity of multimedia as new hardware emerges to meet the studio quality expectations of the home market. All you can do is soldier on with frequent references to the 26-page glossary. The rewards, of course, are spectacular. MMPM/2 is a major factor in the OS/2 vs. Windows struggle, and *Developing Multimedia Applications Under OS/2* provides much-needed ammunition for developers anxious to exploit the booming market for multimedia applications.

OS/2 programmers, both full-time professionals and serious homebrew bricoleurs, will find these books rewarding supplements to the standard IBM reference manuals. **OS/2**

Stan Kelly-Bootle started computing on EDSAC I at Cambridge over 40 years ago and has written at least 11 books. His next book will be *The OpenDoc Primer (SIGS)*. He welcomes e-mail via CompuServe 70323,1560 or Internet skb@crl.com. Try his Web page: <http://www.crl.com/~skb>.

Resources:

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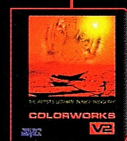
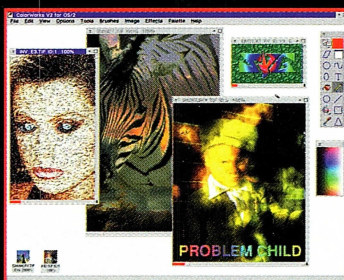
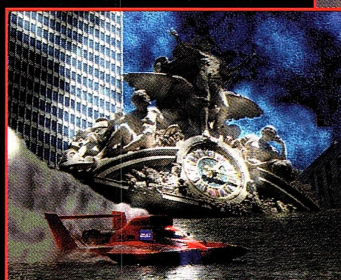


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